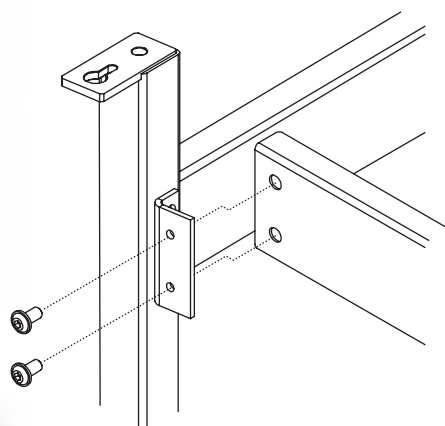


Service Instructions Safety Cabinet MSC-Advantage™



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Contents

1. General notes	6
1.1 Safety instructions for service work	6
1.2 Applicability of the instructions	7
1.3 Warranty	7
1.4 Explanation of symbols	8
1.4.1 Symbols used in the service instructions	8
1.4.2 Symbols on the device	9
1.5 Safety instructions for repairs	10
1.6 Standards and safety regulations	12
2. Tools and auxiliaries	13
2.1 Auxiliaries	13
2.2 List of required tools	13
3. Accessories	14
3.1 Exhaust system accessories	14
3.2 Installing exhaust system accessories	14
3.3 Installing the rack	15
4. Media connections	16
4.1 Load-ins in the sample chamber side panels	16
4.2 Installing media valves	17
5. Covers	18
5.1 Installing covers	18
5.1.1 Installing the light dome	18
5.1.2 Installing the front cover	18
5.1.3 Installing the plenum cover	19
6. Lamps	20
6.1 Replacing fluorescent tubes	20
6.2 Installing fluorescent tube sockets	20
6.3 Replacing UV lamps	21
6.4 Installing UV lamp sockets	21
6.5 Installing ballast units for illumination and UV lamps	22
7. Internal outlets	23
7.1 Installing the electrical outlet for auxiliaries	23
7.2 Installing the disinfection adapter	23
8. Display panel	24
8.1 Replacing the display panel foil	24
8.2 Installing the display/operating panel PCB	24
9. Filter components	25
9.1 Filter application	25
9.2 Installing the perforated plate (filter protection)	26
9.3 Installing the protective grid	27
9.4 Replacing the exhaust filter	28
9.5 Replacing the downflow filter	29
10. Blowers	30
10.1 Installing the exhaust blower	30
10.2 Replacing the downflow blower	31
11. Pressure sensors	32
11.1 Replacing pressure sensors	32

Contents

12. Front window	33
12.1 Replacing the front window	33
12.1.1 Removing the front window	33
12.1.2 Installing the window bracket to the front window	34
12.1.3 Installing the front window	34
12.1.4 Replacing the cable	35
12.2 Replacing the front window handles	36
12.3 Replacing the position switches	37
13. Control box components	38
13.1 Replacing control box electrical components	38
13.2 Connecting alarm contacts	39
14. Device control programming	40
14.1 Program structure	40
14.2 Service level	41
14.2.1 Service level overview	41
14.2.2 Service level settings	42
14.2.3 Overview of key functions in individual operating modes	43
14.3 Error messages on the display	43
15. Auto-calibration routine	44
15.1 Function of the auto-calibration routine	44
15.2 Performing of the auto-calibration routine	44
15.2.1 Starting the auto-calibration routine	44
15.2.2 Automatic cancellation of the auto-calibration routine	45
15.2.3 Manual interruption of the auto-calibration routine	45
15.2.4 Manual cancellation of the auto-calibration routine	45
15.2.5 Manual start of the auto-calibration routine	45
15.2.6 Failures upon starting the auto-calibration routine	45
A. Installation test / Repeat test	46
A.1 Classification of the safety cabinet	46
A.2 Test terms	46
A.3 Extent of the tests	47
A.4 Testing equipment	48
A.5 Electrical safety test	49
A.6 HEPA filter leak test	51
A.7 Inflow velocity test	53
A.7.1 Measurement of the inflow velocity in the work aperture (EN 12469)	53
A.7.2 Calculation of the inflow velocity (EN 12469 / DIN 12980)	55
A.7.3 Exhaust airflow volume test	56
A.8 Downflow velocity test	57
A.9 Airflow pattern test	59
A.9.1 Airflow direction test	59
A.9.2 Leakproofness test for the front window	59
A.9.3 Leakproofness test for edges and corners	60
A.9.4 Leakproofness test for seals and for the upper closing edge	60
A.10 UV intensity test	61
A.11 Setting the monitoring devices	61
A.11.1 Downflow velocity alarm values	61
A.11.2 Inflow velocity alarm values	62

Contents / Figures

B. Decontamination with gas	63
B.1 Disinfection with formaldehyde	63
B.1.1 Procedure	63
B.1.2 Performing gas disinfection	64
B.1.3 Performing gas disinfection using a hood	65
B.1.4 Performing the alternative gas disinfection	66
C. Spare parts	68
D. Test report	72

Figures

Fig. 1 Exhaust system accessories	14
Fig. 2 Mechanical rack installation	15
Fig. 3 Side panel mounting points	16
Fig. 4 Side panel media valve installation	17
Fig. 5 Cover installation	18
Fig. 6 Socket and fluorescent tube replacement	20
Fig. 7 Socket and UV lamp replacement	21
Fig. 8 Illumination / UV lamp ballast unit replacement	22
Fig. 9 Internal outlet replacement	23
Fig. 10 Operating panel display foil replacement	24
Fig. 11 Perforated plate (filter protection) replacement	26
Fig. 12 Protective grid replacement	27
Fig. 13 Exhaust filter replacement	28
Fig. 14 Downflow filter replacement	29
Fig. 15 Exhaust blower replacement	30
Fig. 16 Downflow blower replacement	31
Fig. 17 Pressure sensor replacement	32
Fig. 18 Front window removal	33
Fig. 19 Front window installation	34
Fig. 20 Cable replacement	35
Fig. 21 Handle replacement	36
Fig. 22 Position switches	37
Fig. 23 Control box electrical components	38
Fig. 24 Contact function	39
Fig. 25 Control of external exhaust systems	39
Fig. A1 HEPA filter leak test	52
Fig. A2 Inflow velocity test grid	54
Fig. A3 Test grid above the work aperture	55
Fig. A4 Downflow velocity test grid EN 12469	58
Fig. A5 Airflow pattern I	59
Fig. A6 Airflow pattern II	60
Fig. B1 Gas disinfection using hood	65
Fig. B2 Alternative gas disinfection	66

1. General notes

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1.1 Safety instructions for service work

These operating instructions describe the safety cabinet

- MSC Advantage

and apply to the models MSC 1.2 and MSC 1.8.

Please note that any repairs to the device must be carried out only by personnel with appropriate qualification. Prior to installing spare parts or performing repairs, read these service instructions and the operating instructions carefully.

- The replacement of defined spare parts must be performed only by the Technical Service of Thermo Fisher Scientific or by authorized service personnel that has been trained by Thermo Fisher Scientific.
- Electrical work must be carried out only by electrical expert personnel.
- Work to gas supply lines and to gas supply system components must be carried out only by trained gas and air conditioning expert personnel.
- Service work must be carried out in accordance with the applicable national regulations.

1.**General notes****1.2 Applicability of the instructions**

- The contents of the service instructions are subject to change without further notice.
- Concerning translations into foreign languages, the German version of these service instructions is binding.
- Keep these service instructions close to the device so that safety instructions and important information are always accessible.
- Should you encounter problems that are not detailed adequately in these service instructions, please contact Thermo Fisher Scientific immediately for your own safety.

1.3 Warranty

Thermo Fisher Scientific warrants the operational safety and functions of the safety cabinet only under the condition that:

- the device is operated and serviced exclusively in accordance with its intended purpose and as described in these operating instructions,
- the device is not modified,
- only original spare parts and accessories that have been approved by Thermo Fisher Scientific are used,
- inspections and maintenance are performed at the specified intervals,
- an installation test is performed prior to the initial operation of the device and a repeat test is performed on the occasion of all inspections and repairs.

The warranty is valid from the date of delivery of the device to the operator.

1. General notes

1.4 Explanation of symbols

1.4.1 Symbols used in the service instructions



WARNING!

is used if non-observance may cause serious or even lethal injuries.



CAUTION!

is used if non-observance may cause medium to minor injuries or damage.



NOTE!

is used for hints and useful information.



RECYCLING!

Valuable raw materials can be reused.



Electric shock hazard!



Biohazard!



Hazardous gases!

1. General notes

1.4.2 Symbols on the device



Observe operating instructions (control box ceiling)



Warning against hand injuries (device side walls)



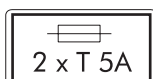
Biohazard (left front section of device)



Checked safety (light dome / upper side of plenum panel)



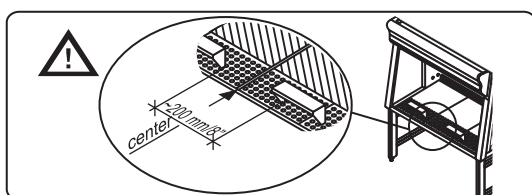
Norme Française / NF - Postes de Sécurité Microbiologique



T5A note (sample chamber fusing)



RS 232 interface (upper side of plenum panel)



Armrest installation
(right side of light dome)

1. General notes

1.5 Safety instructions for repairs

The general safety instructions point out potential hazards during repairs. To prevent constant repetitions, the following safety instructions are not mentioned explicitly in the individual sections; instead, the sections contain only references to the general safety instructions.

Prior to repairs, read the general safety instructions carefully.



WARNING - Toxic hazard / infection hazard!



The safety cabinet can be used for processing dangerous materials:



- infectious substances,
- cytostatic agents, toxic substances.

Therefore, the device or device components may be contaminated.

Always observe the hygiene regulations of the operator!

Prior to beginning service work, cytostatic, infectious or other toxic substances or residues thereof must always be removed completely from the sample chamber!

1. Prior to repairs, enquire the contamination hazard and make sure that the device has been cleaned and disinfected!
2. A certificate of nonobjection from the operator is required.



WARNING - Dangerous gases!



If the safety cabinet is supplied with gases, the external gas supply must be shut off prior to repairs!

1. Make sure that the work rooms are sufficiently ventilated.
2. If equipped, activate the exhaust system.
3. Observe safety data sheets.
4. Report damaged or faulty supply lines or connections to the operator of the device.

1.**General notes****WARNING - Electric shock hazard!**

Contact with current-carrying components may cause a lethal electric shock.

Motor-driven moving device components may cause injuries when switched on accidentally. Prior to repairs, disconnect the device from the power supply system!

1. Isolate the device electrically.
2. Protect the device from accidental reconnection.
3. Make sure the device is deenergized.
4. Ground and short the device.
5. Cover or barrier adjacent components that are under voltage.

**NOTE - Start-up!**

If safety devices were removed or disabled during repairs, the unit must not be started up before the safety devices have been reinstalled and checked for proper operation!

Before the unit is started up and operated, a test run must be performed.

**NOTE - Recycling!**

All device components except the filters can be recycled.

If the device was used to process cytostatic, toxic or infectious substances, the required decontamination measures must be taken prior to disposal or shipping.

If contaminated components are to be discarded during service work, they must be labelled in accordance with their grading as cytostatic, microbiological or otherwise toxic special waste.

1.**General notes****1.6 Standards and safety regulations**

The device complies with the safety requirements of the following standards and directives:

- NF 095 Rev3.2006 / NF - Postes de Sécurité Microbiologique
- IEC 61010-1:2001
- EN 61010-1:2001
- EN 12469:2000
- DIN EN 61326-1:2004-05
- Low Voltage Directive 73/23 EWG
- EMV Directive 89/336 EWG

2. Tools and auxiliaries

2.1 Auxiliaries

Screw connections:

All screw connections have metric threads.

Screw lockings:

All retaining screws with a diameter of 3 mm or more must be installed with a separable adhesive (medium tight) before they are tightened.

Recommended product: Loctite 586.

Torques:

All retaining screws must only be tightened finger-tight (without leverage).

Sealant:

Recommended product: Sista F 109 (Item 40, sealant)

Cleaner:

Commercial dishwashing agents based on soap suds.

Recommended product: Liquinox.

Disinfectant:

For the standard wipe/spray disinfection, a broad-range disinfectant can be used.

Recommended product: Barrycidal 36 or Microcide SQ.

2.2 List of required tools

Multimeter	U / I / Ohm
Allen key set	1.5 – 6 mm
Open-end wrench set	6 – 32 mm
Phillips screwdriver set	magnetic
Slot-head screwdriver set	2 – 6 mm
Socket wrench set	6 – 32 mm
Torx wrench set	T-10 – T-40
Diagonal cutter	
Wire stripper	
Flat connector pliers	
Needle nose pliers	small
Tweezers	
Starter punch	small
Level	small
Heat gun	
Soldering iron	
Solder	
Cable ties	small, black
Screw locking adhesive	medium tight, separable, from M3
Shrink tube	d = 6 mm
Shrink tube with sealant	d = 6 mm
Flat connectors	6.3 mm
Wire end ferrules	1 mm ²

3.

Accessories



NOTE - Item numbers!

The item numbers refer to the spare parts list at the end of these service instructions.

3.1 Exhaust system accessories

Item 20 (exhaust filter MSC 1.2 / 1.8)

Item 30 (activated-carbonfilter MSC)

Fig. 1: The safety cabinet can be equipped with the following exhaust system accessories.

Accessories for exhaust system:

- Exhaust manifold [1] for the direct connection to an on-site exhaust system.
- Draft interruptor [2] for the direct connection to an on-site exhaust system with blower.

Accessories for downflow operation:

- Supplementary filter KAEF [3] for exhaust air
- Supplementary filter KAFC [4] with carbon insert for exhaust air

3.2 Installing exhaust system accessories

Item 40 (sealant)



NOTE - Test according to EN12469:2000!

The test according to EN12469:2000 was performed with the standard version of the safety cabinet, without exhaust system accessories.

Fig. 1: The exhaust system components [1-4] are installed to the exhaust aperture [6] at the device ceiling. The ix thread inserts [7] for the retaining screws [6] are preinstalled in the device ceiling.

To install the supplementary filter KAEF, additional holes must be drilled. For hole dimensioning and positioning, refer to the drilling template supplied with the separate installation instructions for supplementary filter KAEF.

Installation:

1. Switch the device off, disconnect it from the power supply system, and protect it from accidental reconnection.
2. Thoroughly clean the contact surfaces around the exhaust aperture and of the accessory to be installed to ensure that they are absolutely grease- and dust-free.
3. Apply sealant onto the contact surfaces.

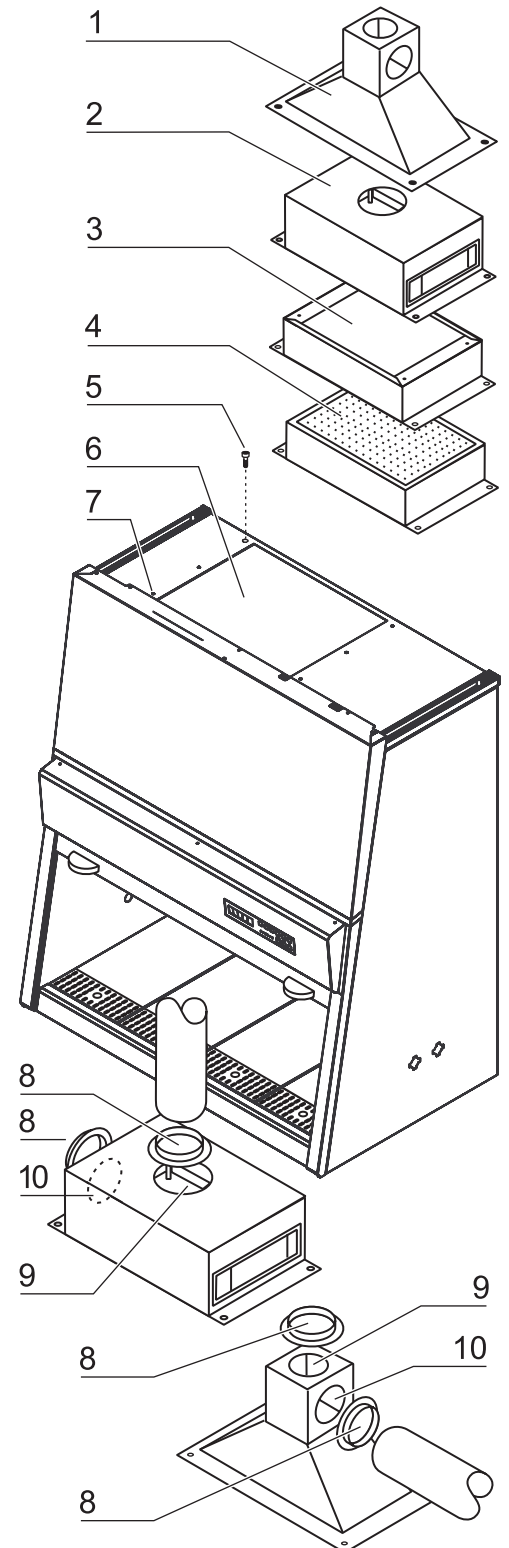


Fig. 1
Exhaust system accessories

3.
Accessories

4. Secure the accessory by tightening the supplied six retaining screws (M 5) finger-tight.
5. Remove any sealant coming out of the joint.

Connection to technical ventilation:

6. The exhaust manifold and the draft interruptor are installed between the safety cabinet and the exhaust pipe of the on-site exhaust system.
7. The supplied adapter [8] (Ø 200 mm) is screwed onto the aperture of the exhaust manifold or draft interruptor.
8. The pipe fitting can be installed to the exhaust manifold either at the top [9] or at the side aperture [10].

3.3 Installing the rack
Item 50 (stand)

1. **Fig. 2:** Slide the two crossmembers [2] onto the retaining angles [3] of the side panels [1], then secure the crossmembers to the two side panels using the screws [4].
2. To install the device frame [5] to the rack [7], install four Allen screws [6] loosely into the threaded holes at the bottom of the device frame.
3. Place the safety cabinet onto the rack so that the Allen screws [6] are routed through the holes [8] of the retaining tabs [10].
4. Slide the device frame [5] into the retaining tab grooves [9] all the way to the stop.
5. Tighten the four Allen screws [6].
6. Level the device. Insert the workplate(s) and place a bubble level onto the plate(s).
7. Rotate the stands [11] of the rack using a 24 mm wrench so that the workplate is exactly horizontal in all directions. Perform the height adjustment of the device stands from left to right and from rear to front.

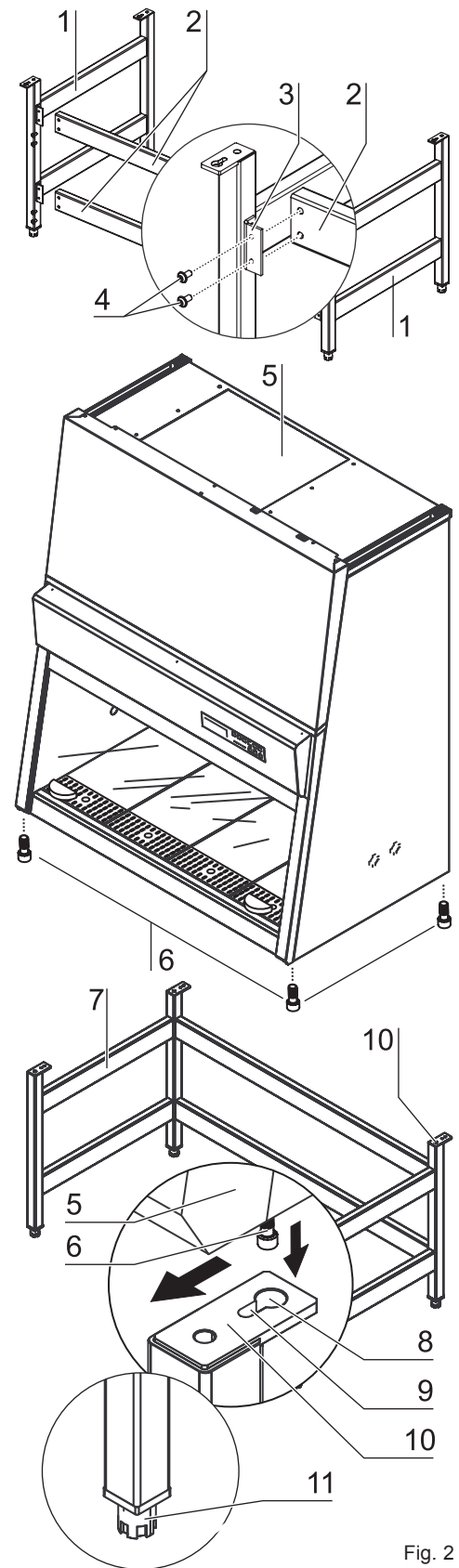


Fig. 2
Mechanical rack installation

4. Media connections

4.1 Lead-ins in the sample chamber side panels

Item 60 (pluggable side panel lead-in)

Fig. 3: The standard version comprises two lead-ins [1] per side panel. The lead-ins can be used for routing cables or for installing media valves (R 3/8"). Upon delivery of the device, the lead-ins are covered.

The lead-in covers must not be removed but pierced through at the predetermined breaking point.

Device side spacing:

A1	225 mm
S1	275 mm
S2	100 mm



NOTE - Media routing!

The lead-ins must only be used for the installation of media valves if said installation is in accordance with the applicable national regulations.

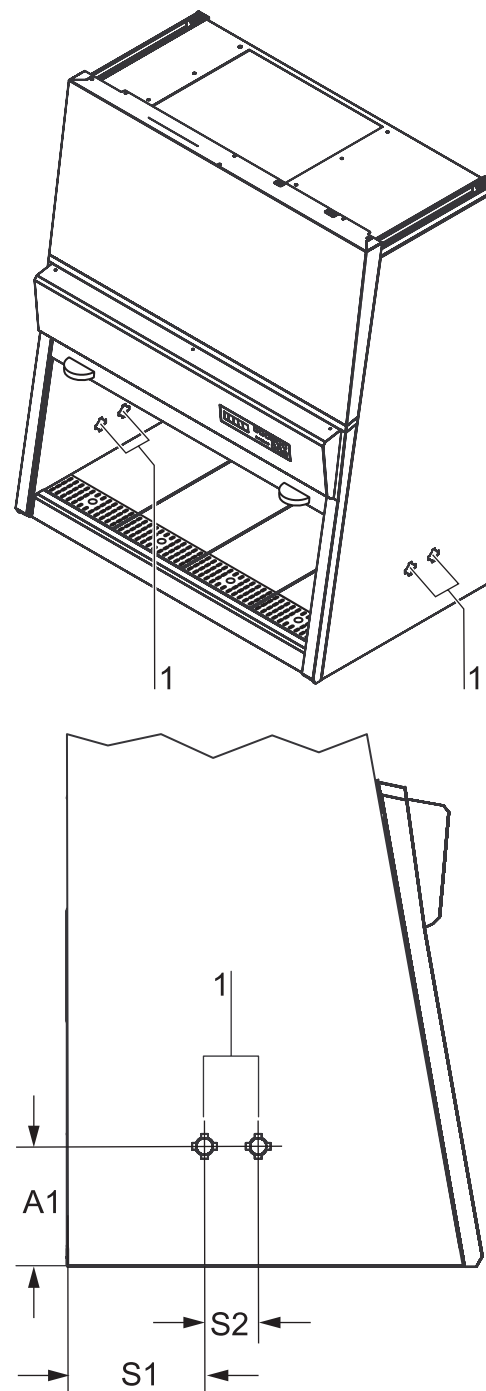


Fig. 3
Side panel mounting points

4. Media connections

4.2 Installing media valves

Item 70 (solenoid valve for gases)

Item 60 (pluggable side panel lead-in)

Installing media valves to the side panels:

Fig. 4: At each side panel, two media valves [2] can be installed to the prefabricated lead-ins [1].

1. Move the front window to the maximal opening position.
2. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
3. Cut the lead-in open circularly at the predetermined breaking point (inside and outside).
4. Slide the gasket [4] and the bezel [3] onto the threaded pipe [6] of the media valve [2].
5. From the inside of the sample chamber, slide the media valve through the desired lead-in.
6. From the outside, slide the other gasket [5] and the washer [7] onto the media valve threaded pipe [6].
7. Secure the media valve to the side panel lead-in using the nut [8].
8. Establish the connection to the media line using a union nut [9].



NOTE - Media valve removal!

After a media valve has been removed, the resulting opening must be plugged using pluggable lead-ins (part no.: 50110785).



NOTE - Combustible gases!

If the sample chamber is to be supplied with combustible gas, the solenoid valve of the media valve must be integrated into the device control system. Due to the layout of the gas supply, gas is applied when the device is ready for operation. For wiring diagrams for the integration of the solenoid valve into the device control system, see the annex of the instructions.

Installing the solenoid valve:

The solenoid valve [10] is installed externally into the side supply line.

1. Screw the solenoid valve [10] into the supply line.
2. Connect the connecting cable [11] to the device control system (see wiring diagrams in annex of instructions).

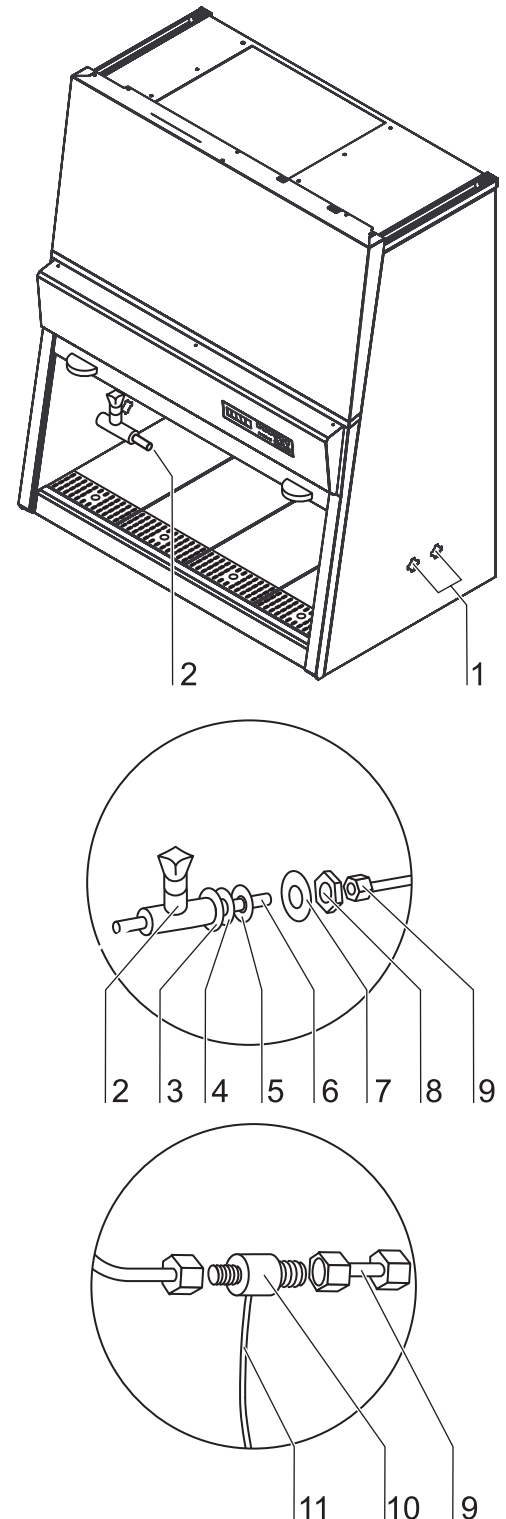


Fig. 4
Side panel media valve
installation

5.

Covers

5.1 Installing covers

- Item 80 (moulding MSC 1.2 / 1.8)**
- Item 90 (light dome MSC 1.2 / 1.8)**
- Item 95 (adhesive label "LNE")**
- Item 100 (light dome screw)**
- Item 110-120 (front window guide cover left / right)**
- Item 130-140 (front window stop left / right)**

The assemblies of the device electronic system and of the sample chamber illumination as well as the filter and plenum blower assemblies (blower chamber) are accessible only from the front.

To access the assemblies, the following covers must be removed:

- **Fig. 5:** Assembly operating panel with display, ballast units, switching contacts, and sample chamber illumination on light dome fitting panel [8]:
 - ▶ left and right guide rail [5], light dome [4].
- Assembly device control main PCB and power supply units on electrical fitting panel [6]:
 - ▶ Guide rails [5], light dome [4], and front cover [1].
- Assembly filter and blower in plenum [7]:
 - ▶ Guide rails [5], light dome [4], front cover [1], cable duct [3], and plenum cover [2].

5.1.1 Installing the light dome

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. **Fig. 5:** Remove the left and right guide rails [5]. The bottoms of the rails are screwed to the device frame.
3. Slide the front window down beyond the closing position.
4. Remove the three retaining screws at the top of the light dome [4] and the knurled screws at the bottom.
5. Remove the light dome.

5.1.2 Installing the front cover

- Item 150 (front cover MSC 1.2 / 1.8)**
- Item 160 (knurled screw for front cover)**

1. Remove the light dome (see Section 5.1.1).
2. **Fig. 5:** Remove the three retaining screws at the upper splay of the front cover [1].
3. Remove the front cover.

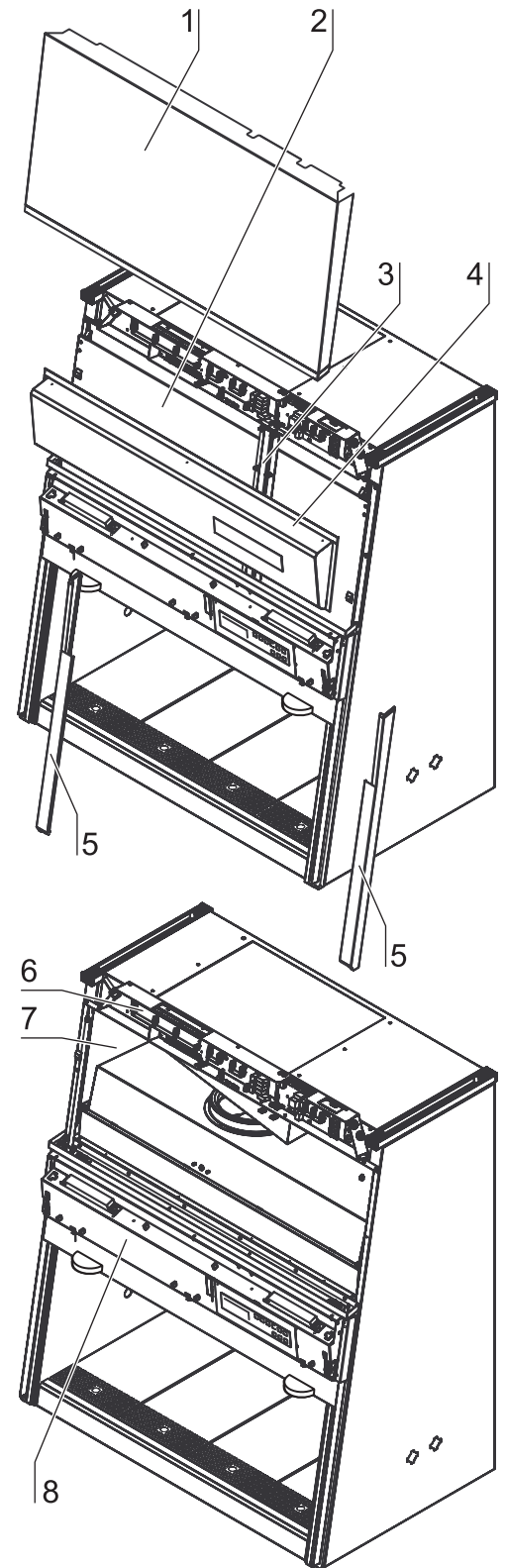


Fig. 5
Cover installation

5.**Covers****5.1.3 Installing the plenum cover****Item 170 (cover MSC 1.2 / 1.8)****Item 180 (seals MSC 1.2 / 1.8)**

1. Remove the light dome (see Section 5.1.1).
2. Remove the front cover (see Section 5.1.2).
3. **Fig. 5:** Remove the cable from the cable terminals of the cable duct [3] and remove the cable duct.
For this purpose, remove the three retaining screws at the upper splay as well as the retaining screw at the lower splay and remove the cable duct.
4. Remove the cover retaining screws [2] and remove the cover panel.

Installing the cover:**NOTE - Seal condition!**

Prior to installing the cover panel, check the flat seal for damage and replace it as required.

5. Clean the contact surfaces of the seal at the cover panel.
6. Secure the cover panel using the screws.

Replacing the seal:

7. Remove the old seal using a putty knife.
8. Thoroughly clean the contact surfaces of the seal at the device frame.
9. Remove the backing tape from the self-adhesive flat seal, then attach the new flat seal so that the joints are absolutely tight in the corners.

6.

Lamps

6.1 Replacing fluorescent tubes

Item 190 (fluorescent tube)

Fig. 6: The sample chamber is illuminated by fluorescent tubes [4]; the number of tubes depends on the model:

- MSC 1.2: one fluorescent tube,
- MSC 1.8: two fluorescent tubes.

The spring-loaded rotating sockets [6] of the fluorescent tubes are installed to the light dome mounting frame [3] in the sample chamber.

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome [1] (see Section 5.1.1).
3. The fluorescent tube is retained and connected to the electrical system by two rotating sockets [6].
To remove, rotate the tube carefully counterclockwise to the removal position and remove it from the sockets.
4. To install, insert the contact pins of the new tube into the grooves of the rotating sockets and rotate the tube clockwise to the electrical contact position to latch the sockets.

6.2 Installing the fluorescent tube sockets

Item 200 (rotating sockets for fluorescent tubes)

Item 210 (cable support)

Fig. 6: Brackets [5] in the notches [2] secure the fluorescent tube sockets [6] to the mounting frame [3].

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome [1] (see Section 5.1.1).
3. Remove the fluorescent tube (see Section 6.1).
4. Disconnect the wiring [7] from the sockets (wiring diagrams see annex).
5. Pry the bracket [5] out of the notch [2] and lift it out of the notch.
6. To install, insert the new socket [6] through the notches at the mounting frame and push it in until it engages audibly.
7. Connect the wiring [7] to the sockets.
8. Install the fluorescent tubes.
9. Install the light dome to the mounting frame.

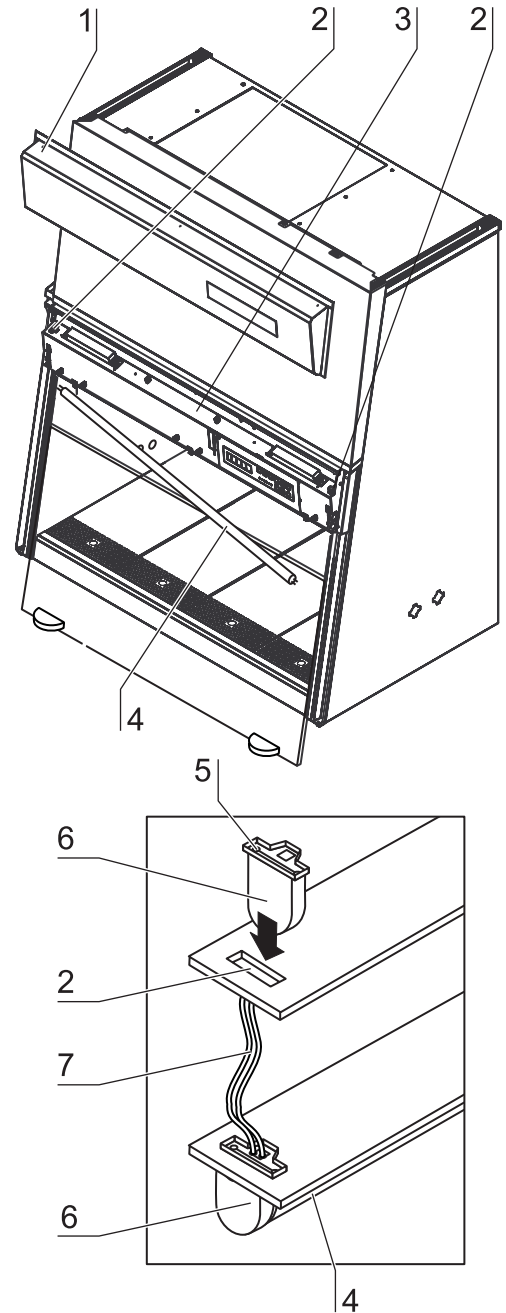


Fig. 6
Socket and fluorescent tube
replacement

6. Lamps

6.3 Replacing UV lamps

Item 220 (UVC degermination lamp)

Fig. 7: The optional, device-integral UV lamp [1] is installed to a mounting bezel [2] in the sample chamber front area at the ceiling.

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Slide the front window [3] down (cleaning position)
3. The UV lamp [1] is retained and connected to the electrical system by two rotating sockets [6].
To remove, rotate the UV lamp carefully counterclockwise to the removal position and remove it from the sockets.



NOTE - Wear protective gloves!

Wear protective gloves to prevent skin fat residues from burning into the UV lamp tube.

4. To install, slide the lamp contact pins into the grooves of the rotating sockets [3] and rotate the lamp clockwise to latch the sockets.

6.4 Installing UV lamp sockets

Item 230-240 (mounting bezel UV MSC 1.2 / 1.8)

Item 250 (rotating socket for UVC)

Item 260 (UV cable lead-in)

Fig. 7: The rotating sockets [6] of the UV lamp [1] are attached to the notches [4] of the mounting bezel [2].

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the UV lamp (see Section 6.3).
3. Remove the perforated plate (see Section 9.2).
4. Remove the retaining screws from the holes [7] and remove the mounting bezel [2].
5. Disconnect the wiring [5] from the rotating sockets (wiring diagrams see annex).
6. Pry the rotating sockets [6] out of the notches [4] and lift them out of the notches.
7. To install, insert the new rotating sockets [6] through the notches [4] at the mounting frame and push them in until they engage audibly.
8. Connect the wiring [5] to the rotating sockets.
9. Secure the mounting bezel using the screws.
10. Install the UV lamp.

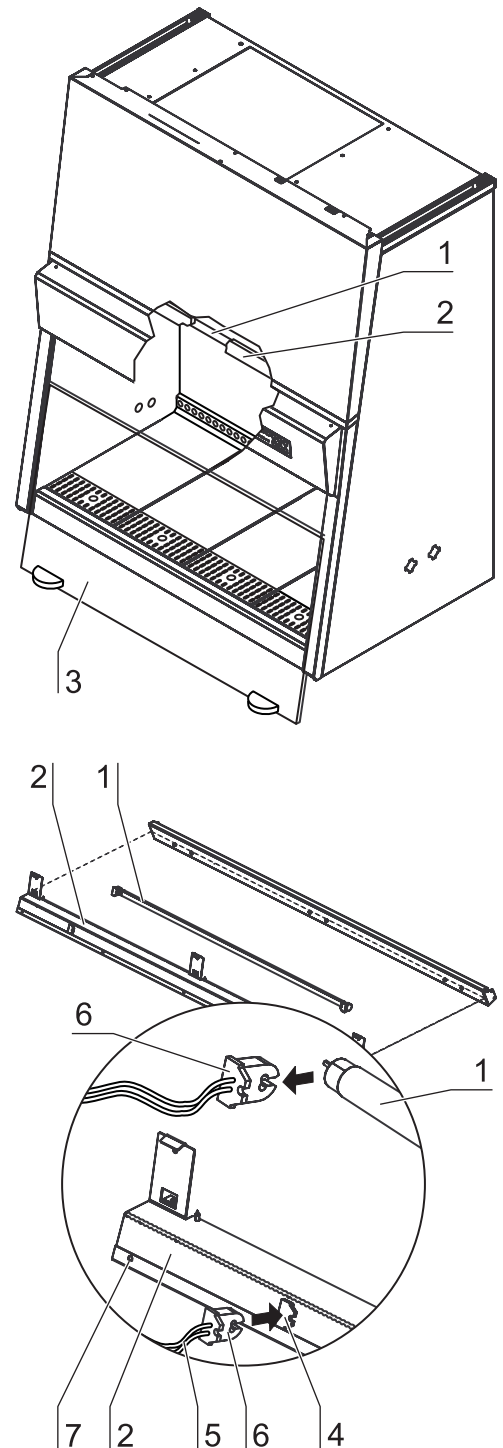


Fig. 7
Socket and UV lamp
replacement

6.
Lamps
6.5 Installing ballast units for illumination and UV lamps

Item 280-290 (illumination ballast unit MSC 1.2 / 1.8)

Item 300 (UV lamp ballast unit)

Item 270 (terminal)

Fig. 8: The fluorescent tube ballast unit [4] and the UV lamp ballast unit [3] are attached to the mounting frame [2] of the light dome [1].

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Disconnect the power supply cables [5] and [8] from the ballast units.
4. Each ballast unit is secured to the mounting frame using two tabs and screws. Remove the two retaining screws, then remove the ballast unit [7].
5. Install the new ballast unit to the mounting frame.
6. Connect the power supply cable.
7. Install the light dome (see Section 5.1.1).

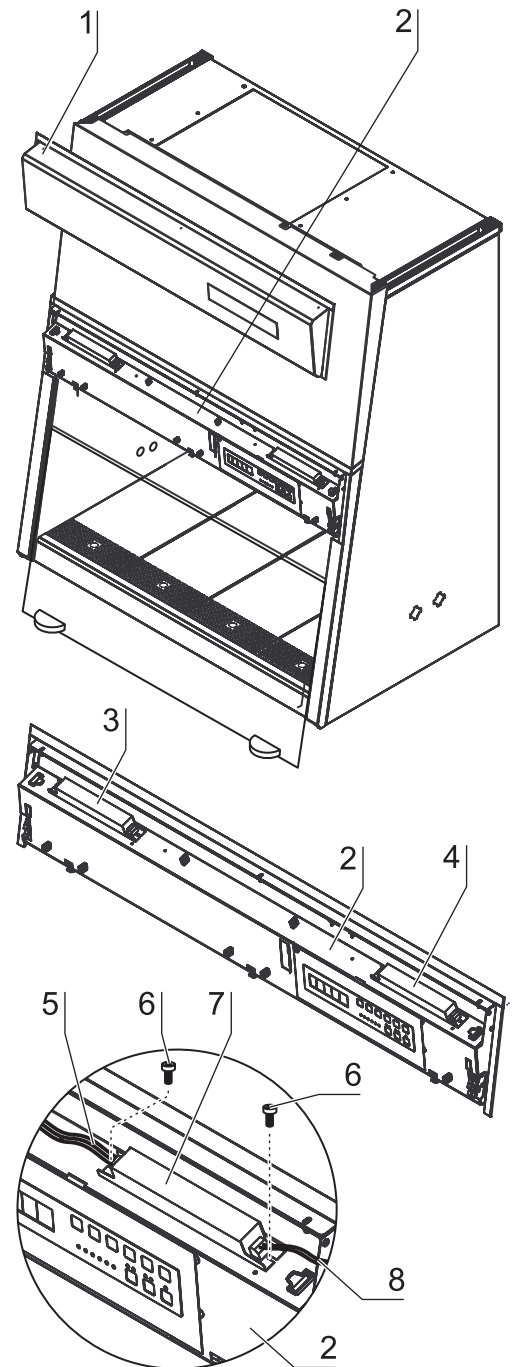


Fig. 8
 Illumination / UV lamp ballast
 unit replacement

7. Internal outlets

7.1 Installing the electrical outlet for auxiliaries

Item 310-320 (outlet)

Item 40 (sealant)

Fig. 9: The two outlets [3] (total current 5 A max) for the power supply of auxiliaries are installed to the sample chamber backpanel.

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Move the front window to the maximal opening position.
3. The bezel [2] and outlet [3] assembly is secured with screws to the backpanel. Remove the two retaining screws [1] from the threaded holes [5] and [7].
4. Cut the sealant between backpanel and outlet using a thin blade.
5. Remove the outlet [3] and disconnect the wiring [4] and [6] from the outlet.
6. Remove all sealant residues from the backpanel; the contact surfaces must be dust- and grease-free.
7. Connect the wiring to the new outlet (wiring diagrams see annex).
8. Insert the bezel with the outlet into the notch and secure it to the threaded holes [5] and [7] of the backpanel using screws.
9. Seal the joint between backpanel and outlet bezel using sealant.

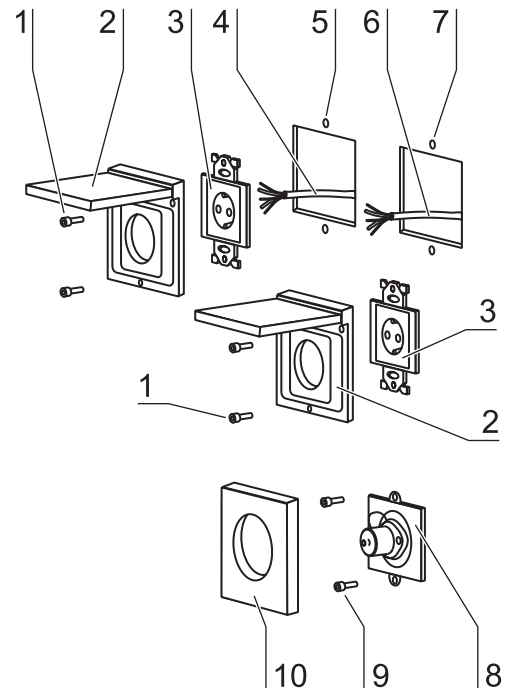


Fig. 9
Internal outlet replacement

7.2 Installing the disinfection adapter

Item 330-370 (disinfection adapter)

Item 40 (sealant)

Fig. 9: Optionally, a disinfection adapter [8] for connecting a mobile UV lamp can be installed instead of the outlet [3]

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Move the front window to the maximal opening position.
3. Remove the outlet and isolate the connecting cables (see Section 7.1).
4. Remove all sealant residues from the backpanel; the contact surfaces must be dust- and grease-free.
5. Connect the wiring to the disinfection adapter (wiring diagrams see annex).
6. Insert the disinfection adapter [8] into the notch and secure it to the threaded holes [5] and [7] of the backpanel using the retaining screws [9].

8. Display panel

7. Attach the bezel [10] to the disinfection adapter [8].
8. Seal the joint between backpanel and disinfection adapter using sealant.

8.1 Replacing the display panel foil

Item 380 (keypad front foil)

Fig. 10: The display panel labeling is printed onto a self-adhesive foil which is a non-reusable component.

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Heat the display foil [2] slightly using a heat gun, then peel it off the light dome [1].
3. Clean the foil area at the light dome. The foil area must be dust- and grease-free.
4. Remove the new display foil from the backing carton, position it at the light dome and rub it on using a soft, clean cloth.

8.2 Installing the display/operating panel PCB

Item 390-430 (display)

Fig. 10: The PCB [4] for the display/operating panel [3] is secured to the light dome [1] using screws.

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Disconnect the wiring connector [7] from the PCB.
4. Remove the retaining screws [6], then remove the PCB.
5. Place the new PCB onto the spacer [5] and secure it using the screws.
6. Connect the wiring connector to the PCB.
7. Install the light dome (see Section 5.1.1).

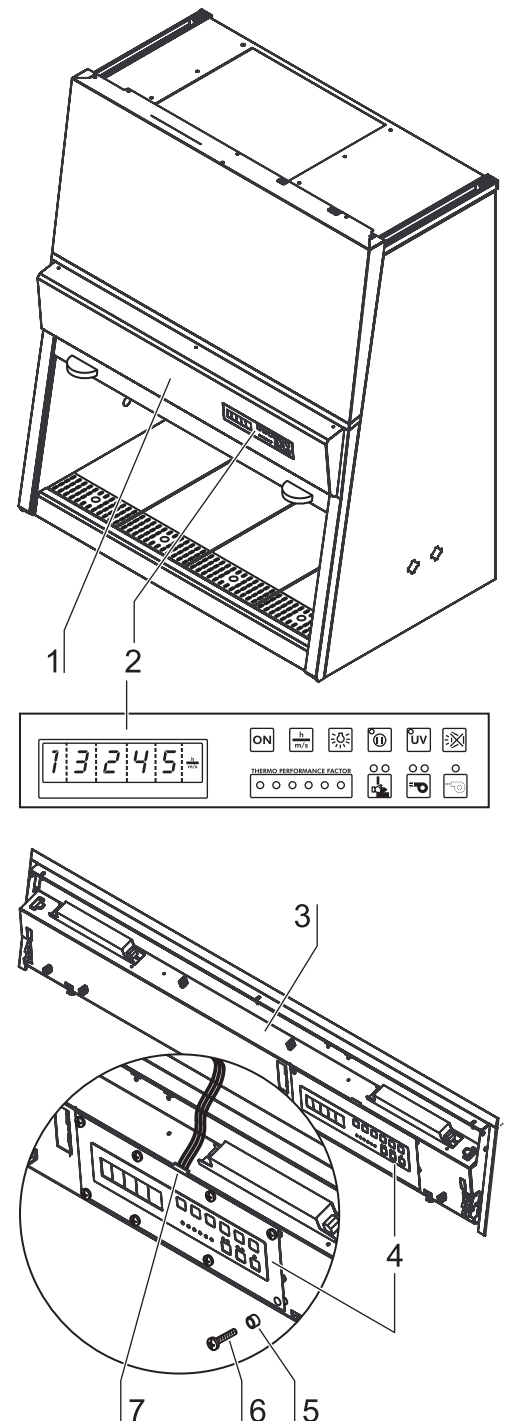


Fig. 10
Operating panel display foil
replacement

9.
Filter components
9.1 Filter application

The procedures and measures that have to be considered for filter replacement depend on the application of the device and on the substances processed within the safety cabinet. If toxic substances were processed, the device has to be decontaminated properly prior to any filter replacement. In this case, none of the filters can be reused and must therefore be discarded in accordance with the applicable national regulations for the disposal of special waste.


NOTE - Competence certificate!

As filter replacement is regarded as an interference with the safety system of the device, this work must only be carried out by the Technical Service of Thermo Fisher Scientific or by specially trained and authorized service personnel.


NOTE - Certificate of nonobjection!

If disposal of the device is delegated to a third party, the operator must make sure that this third party is in possession of the applicable licences or permissions. The operator must receive a certificate of nonobjection as a confirmation of proper disposal, including the proper disinfection of the device.


CAUTION - Contamination hazard!

As the safety cabinet can be used for processing infectious substances and materials, the device or device components may become contaminated.

Observe the hygiene regulations of the operator!

- **Wear safety gloves.**
- **Wear safety goggles.**
- **Wear mouth and nose protection to protect the mucous membranes.**
- **Prior to repairs, enquire about potential infection hazards.**
- **Toxic or pathogenic substances or any residues thereof must have been removed completely.**

9.

Filter components

- Prior to inspections or repairs, check to see if the device has been cleaned and disinfected.
- Ask the operator for a certificate of nonobjection with indications to the execution of the decontamination measures.

9.2 Installing the perforated plate (filter protection)

Item 440-450 (perforated plate MSC 1.2 / 1.8)
 Item 460 (tapping screw)

Fig. 11: The perforated plate [1] protects the downflow filter at the sample chamber ceiling from damage and controls the downflow behavior of the air that flows from the downflow filter into the sample chamber.

At the front, the perforated plate rests on the UV lamp mounting bezel [2], at the sample chamber backpanel it rests on three pairs of screws [5].

1. Move the front window to the maximal opening position.
2. **Fig. 11:** Remove the tapping screws [5] from the front edge of the perforated plate [1].
3. Remove the rear pairs of screws [6]. The perforated plate [1] can now be tilted downward and removed.

Installation:

4. Align the perforated plate [1] so that the chamfer [1] is at the right front position. Place the perforated plate first onto the front tabs [4] of the mounting bezel [3], then tilt it upward.
5. Install the pairs of screws [6] to the backpanel, then secure the perforated plate to the mounting bezel [3] using the tapping screws [5].



NOTE - Downflow air behavior!

The perforated plate controls the downflow air behavior of the device. Make sure that the perforated plate is properly aligned (chamfer is at right front position) and positioned absolutely level on all contact points.

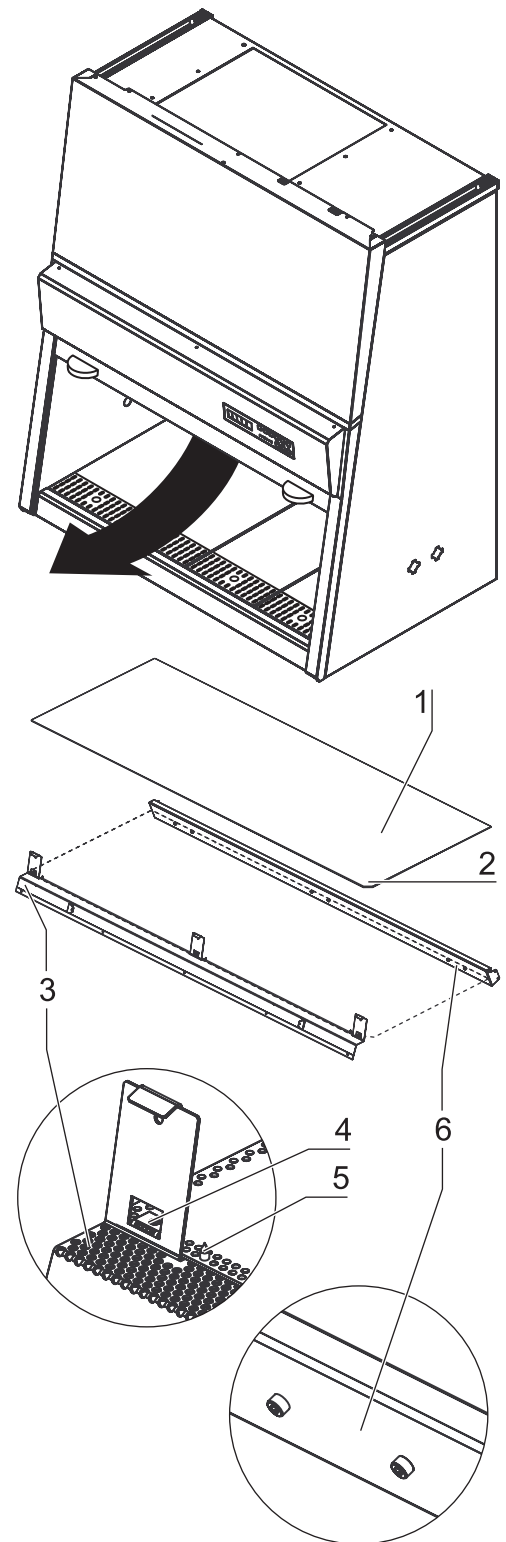


Fig. 11
 Perforated plate (filter protection) installation

9.

Filter components

9.3 Installing the protective grid

Item 470 (protective grid)

Item 480 (workplate module)

Fig. 12: The multi-segment protective grid is retained in the installed position between support surface and airduct wall by its own tension.

1. To remove a grid segment [2], push the retaining tab [1] down until the grid segment can be removed from below the counterholder [3] of the wall.
2. To install the grid segment [2], first place it behind the fixed points [4], then push the retaining tab [1] down and against the counterholder [3] of the wall so that the counterholder engages in the tab.



NOTE – Protective grid!

Do not operate the device without protective grid. Prior to any start-up of the device, make sure that the protective grid is installed!

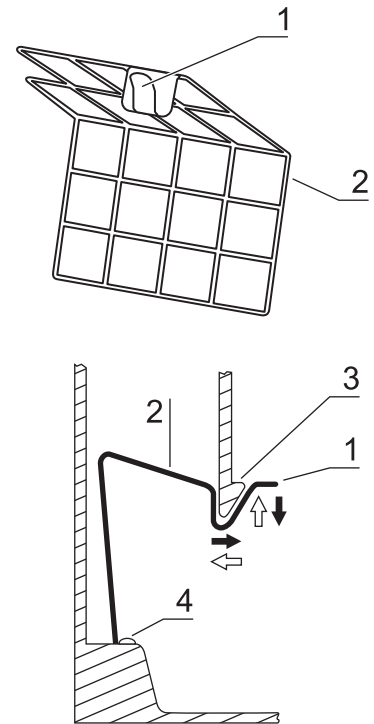


Fig. 12
Protective grid replacement

9. Filter components

9.4 Replacing the exhaust filter

Item 490 (exhaust filter MSC 1.2 / 1.8)

Fig. 13: The exhaust filter [1] is installed immediately onto the exhaust plenum [2]. The exhaust plenum is secured with four wing nuts [5] to the two ceiling mouldings [4]. When the exhaust pleum is removed, spring plates [7] retain the exhaust filter in its mounting position.

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Remove the front cover (see Section 5.1.2).
4. Remove the plenum cover (see Section 5.1.3).
5. Remove the exhaust blower and place it onto the downflow plenum [3] (see Section 10.1).
6. Remove the wing nuts [5] so that the exhaust plenum [2] can be shifted below the ceiling mouldings [4].
7. Slide the exhaust plenum slightly forward so that the wing nuts can be routed through the notches [6] and the exhaust plenum can be lowered. Remove the exhaust plenum from the safety cabinet.
8. Turn the spring plates [7] that retain the exhaust filter aside, lower the exhaust filter, and remove it.
9. Discard the exhaust filter properly.
10. Check the replacement filter seal for perfect condition. Insert the replacement filter into the ceiling mouldings [4] and secure it using the spring plates.
11. Install the exhaust plenum to the wing nuts and push it backward. Tighten the wing nuts on all sides. The filter seal must be level at the exhaust guide upper frame and at the exhaust plenum frame.
12. Install the exhaust blower (see Section 10.1).
13. Install the covers (see Section 5.1.1 - 5.1.3).

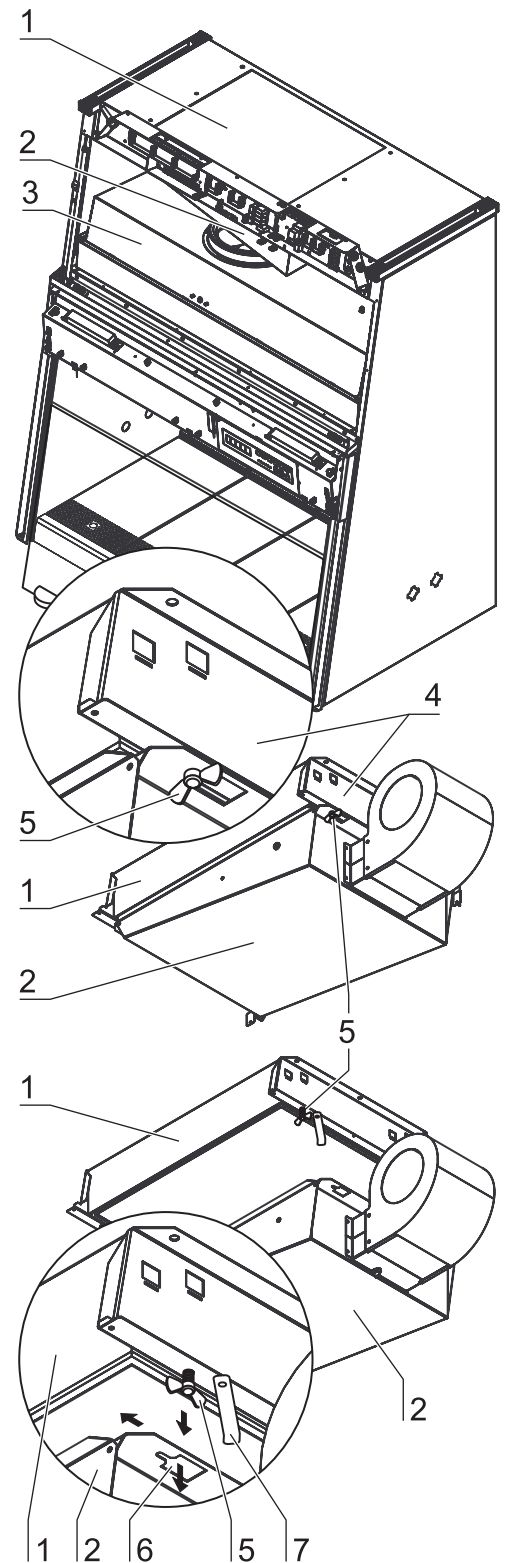


Fig. 13
Exhaust filter replacement

9. Filter components

9.5 Replacing the downflow filter

Item 500 (downflow filter MSC 1.2 / 1.8)

Item 510 (pressure moulding)

Item 520 (screws)

Fig. 14: The downflow filter [3] is located below the downflow plenum [2] of the downflow blower. The backside of the downflow plenum is attached to a hinge and can be tilted up with the downflow blower after the downflow unit components have been removed from the mounting location [1].

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Remove the front cover (see Section 5.1.2).
4. Remove the plenum cover (see Section 5.1.3).
5. Remove the exhaust blower and place it onto the downflow plenum (see Section 10.1).
6. Remove the exhaust plenum from the safety cabinet (see Section 9.4)
7. Remove the retaining screws [4] of the downflow plenum [2].
8. Disconnect the pressure mouldings [5], then tilt the downflow plenum [2] up and secure it by inserting e.g. a screwdriver [10] through the holes of the U-shaped moulding [9] into the side panel openings [8].
9. Remove the downflow filter [3] from the front and discard it properly.
10. Insert the replacement filter so that the side with the filter labeling is visible. Check the filter seal for perfect condition.
11. Tilt the downflow plenum down onto the filter.
12. Connect the pressure mouldings [5] and install the retaining screws [4]. The filter seals must be level at the lower seal frame [6] and at the downflow plenum frame [7].
13. Install the downflow plenum and the downflow blower and make sure that the seals are seated correctly (see Sections 9.4 and 10.1).
14. Install the covers (see Section 5.1.1 - 5.1.3).

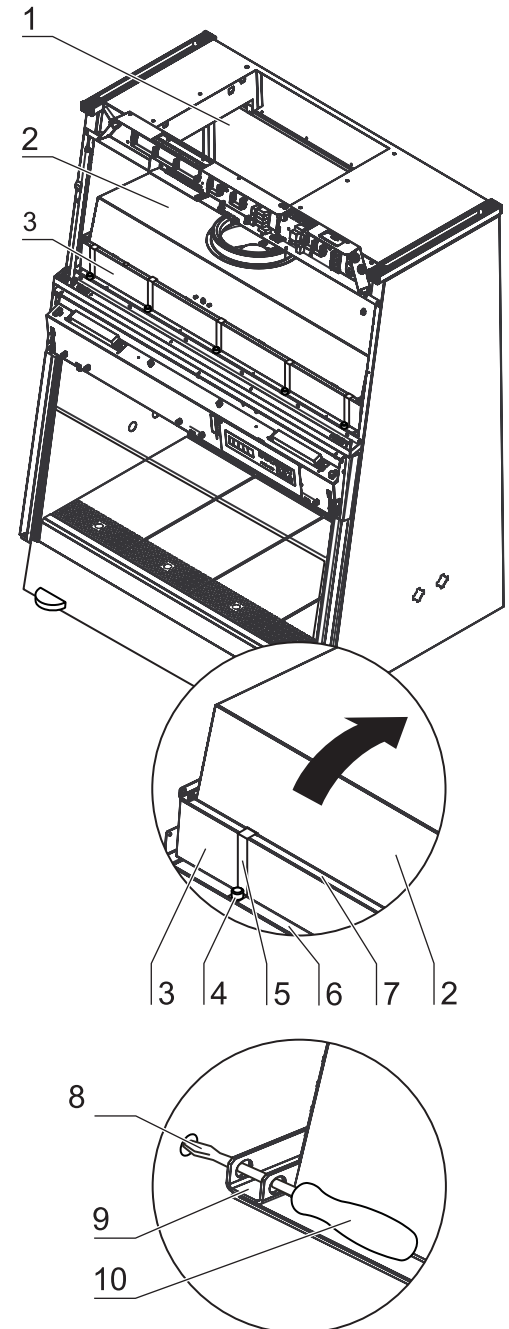


Fig. 14
Downflow filter replacement

10.
Blowers
10.1 Installing the exhaust blower

Item 530-540 (exhaust blower right adjustable / left adjustable)

Item 520 (screw)

Item 550 (wing nut for exhaust plenum)

Item 560 (clamping disk)

Fig. 15: The exhaust blower [1] is secured to the housing of the exhaust plenum [5] with three tabs [4] at the panel and with two screws [2] at the retaining angles [3].

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Remove the front cover (see Section 5.1.2).
4. Remove the plenum cover (see Section 5.1.3).
5. Disconnect the blower wiring in the control box and route it through the device housing.
6. Remove the two retaining screws at the retaining angles [3] and disconnect the exhaust blower from the housing of the exhaust plenum [5].
7. To install, connect the exhaust blower into the exhaust plenum housing so that the housing panel is located between the three tabs [4].
8. Then secure the exhaust blower to the housing by installing the retaining screws through the retaining angles.
9. Route the wiring through the notches into the control box and connect it. Make sure that the cable lead-in sealing is seated tightly in the notches.
10. Install the covers (see Section 5.1.1 - 5.1.3).

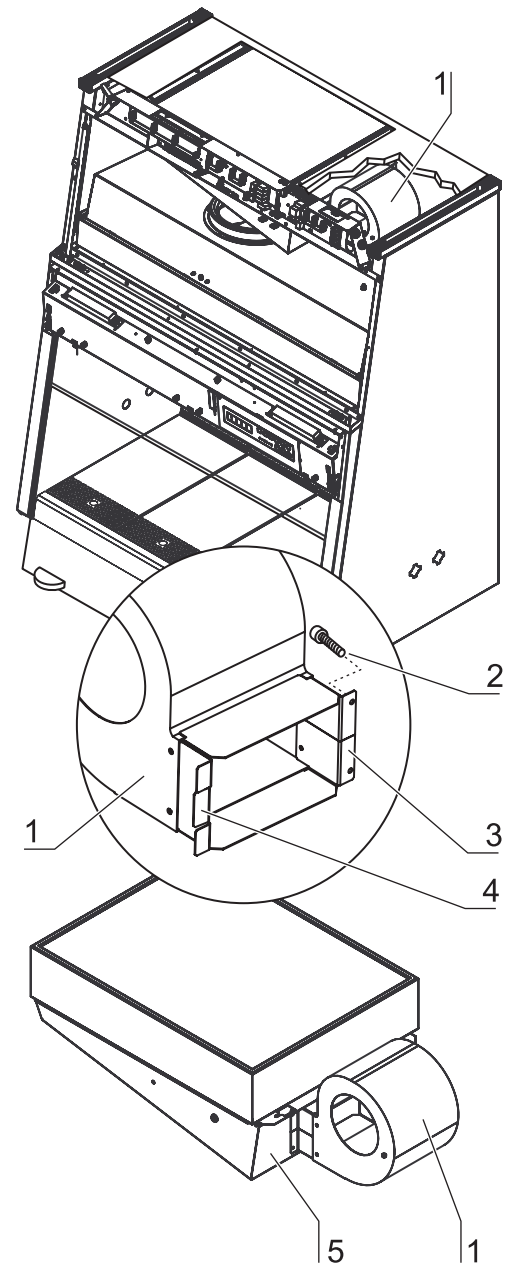


Fig. 15
Exhaust blower replacement

10.
Blowers
10.2 Replacing the downflow blower

Item 570 (downflow blower)

Item 580 (Torx screw for blower)

Item 590 (hose support)

Fig. 16: The downflow blower [1] is installed to a crossmember [6] in the downflow plenum [2].

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Remove the front cover (see Section 5.1.2).
4. Remove the plenum cover (see Section 5.1.3).
5. Remove the exhaust blower and place it onto the downflow plenum (see Section 10.1).
6. Remove the exhaust plenum from the safety cabinet (see Section 9.4)
7. Disconnect the blower wiring in the control box and route it through the device housing.
8. Tilt the downflow plenum up and secure it, then remove the downflow filter (see Section 9.5).
9. Remove the four retaining screws [5] from the threaded bushings and remove the downflow blower [1] with the crossmember [6] from the downflow plenum.
10. Secure the replacement blower to the crossmember using the four retaining screws [5] and position the crossmember with the blower at the interior of the downflow plenum so that it is seated centered below the inflow nozzle [3].
11. Secure the crossmember to the downflow plenum using screws.
12. Make sure that the wiring grommet [4] seals properly at the downflow plenum.
13. Install the downflow filter (see Section 9.4/9.5).
14. Route the wiring through the notches into the control box and connect it. Make sure that the cable lead-in sealing is seated tightly in the notches.
15. Install the downflow plenum and the downflow blower and make sure that the seals are seated correctly (see Sections 9.4 und 10.1).
16. Install the covers (see Section 5.1.1 - 5.1.3).

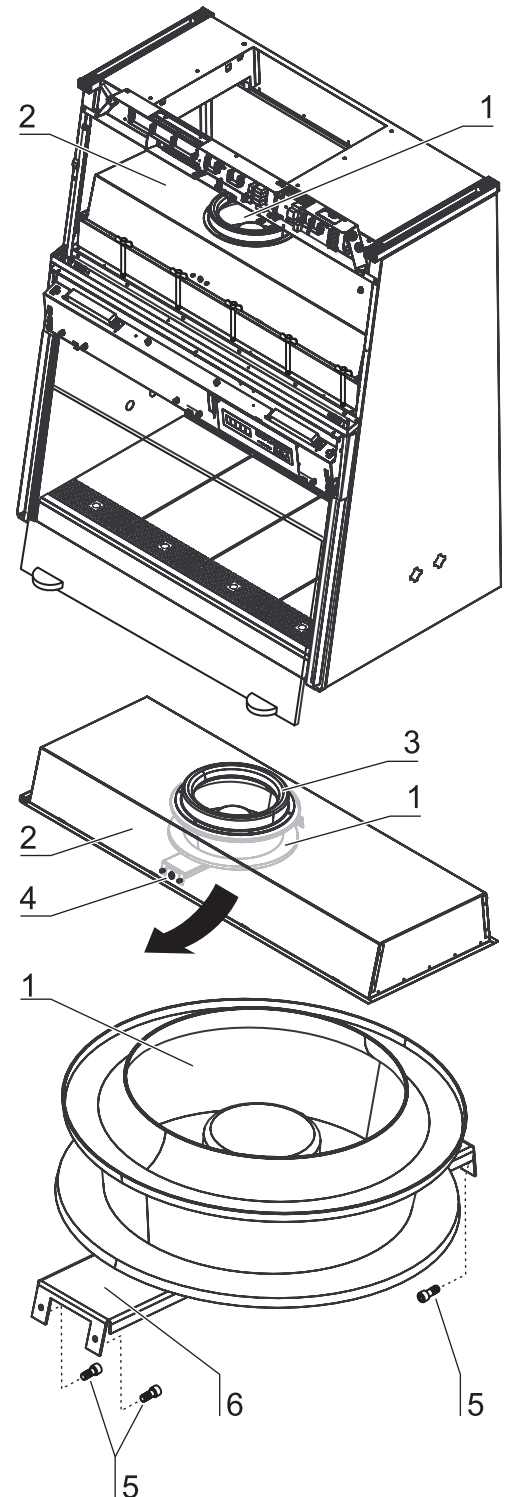


Fig. 16
Downflow blower replacement

11. Pressure sensors

11.1 Replacing pressure sensors

Item 600 (pressure sensor)

Item 610 (test hose sealing cap)

Item 620 (PVC hose)

Fig. 17: The pressure sensors for exhaust air [4] and downflow air [2] are installed to a web plate [3] at the plenum chamber ceiling.

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Remove the front cover (see Section 5.1.2).
4. Remove the plenum cover (see Section 5.1.3).
5. Disconnect the wiring [1] and the compressed-air hoses [6] and [7].
6. The pressure sensors are merely inserted in the bracket [3] and are lifted for removal.
7. Insert the replacement pressure sensor into the bracket, connect the compressed-air hose [6] for exhaust air to the sleeve [5], and connect the compressed-air hose [7] for downflow air to the sleeve [8].
8. Connect the wiring to the connections.
9. Install the covers (see Section 5.1.1 - 5.1.3).



NOTE - Wire / hose connections!

Make sure that the hoses and wires are connected properly to the pressure sensors. The hoses are always connected to P1 at the sensor.

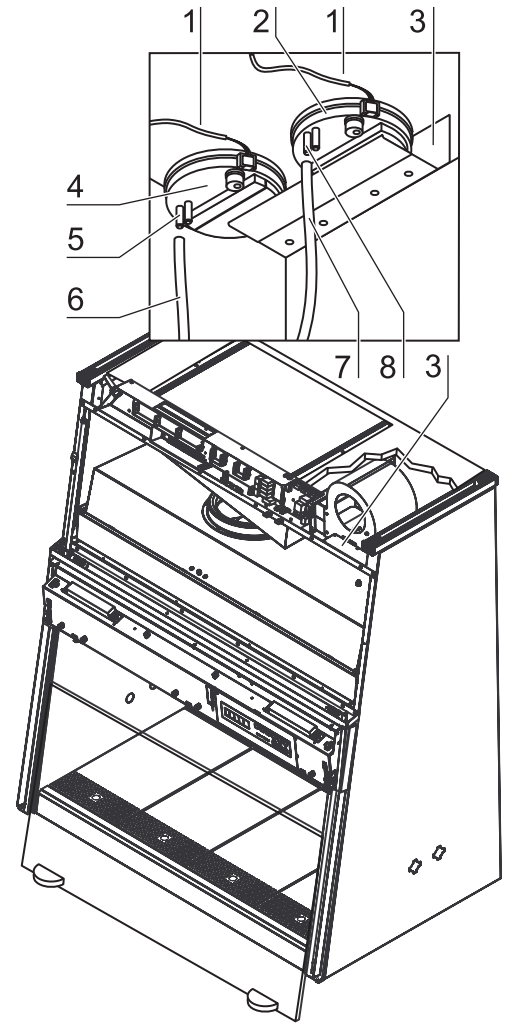


Fig. 17
Pressure sensor replacement

12. Front window

12.1 Replacing the front window

Item 660 (front window installed MSC 1.2 / 1.8)
 Item 630-650 (cable guard)
 Item 650 (polyamide cable)
 Item 670 (handle for front window)
 Item 665 (adhesive tape)
 Item 675 (damper front window top)

Fig. 18: To dismount the front window [1], lower it and remove it from the light dome mounting frame [2].

12.1.1 Removing the front window

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Remove the front cover (see Section 5.1.2).
4. Lower the front window beyond the closing position.
5. Secure the counterweight at the device backpanel in the transport protection by installing the four transport protection retaining screws.



NOTE - Front window protection!

To prevent the front window from accidentally detaching from the frame, the window must be secured before the two cable protections are removed.

- Support front window from below.
- Secure the sides to the device housing using adhesive tape.

6. Remove the Torx screw [6] of the cable [4] from the box nut [9].
7. Remove the two Torx screws [7] from the two box nuts [13].
8. Remove the front plate [5] from the window bracket [3].
9. Disconnect the cable [4] from the box nut [9].
10. Lower the front window and remove it from the light dome mounting frame using suction cups.
11. Remove the two Torx screws [12], then remove the skid [11] from the window bracket counterplate [10].
12. Remove the counterplate and the skid from the front window clamp [8].

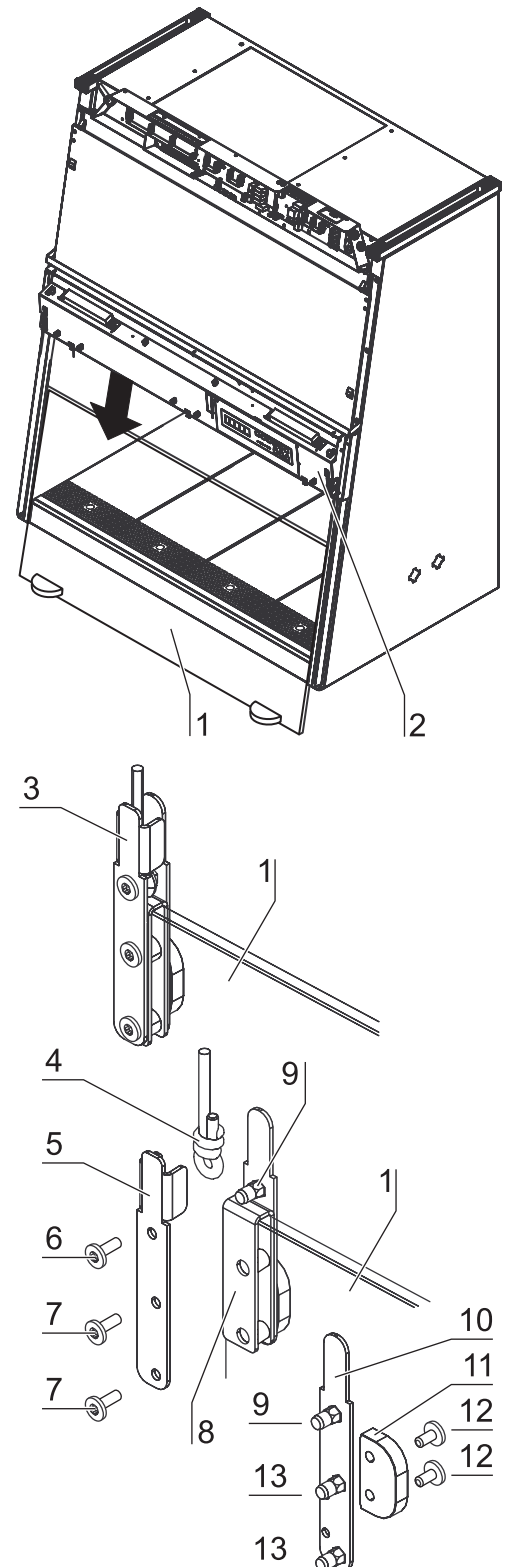


Fig. 18
Front window removal

12. Front window

12.1.2 Installing the window bracket to the front window

1. **Fig. 19:** Insert the hose sleeves [9] into the holes [16] of the front window [15].
2. Place the clamp [8] onto the front window above the holes [16].
3. Insert the box nuts [11] into the hexagon notches of the counterplate [10].
4. Secure the skid [12] to the counterplate using the two Torx screws [13].
5. Insert the counterplate with the two lower box nuts into the holes of the front window and of the clamp.
6. Connect the cable [2] to the upper box nut [11].
7. Secure the window bracket front plate [7] to the box nuts [11] using the three Torx screws [6].

12.1.3 Installing the front window

8. **Fig. 19:** Check to see if the slide seals [4] are in acceptable condition and replace the seals as required.
9. Install the front window [15] below the light dome mounting frame [5] using suction cups.
10. Secure the front window in the mounting position:
 - Support the window from below.
 - Secure the sides to the device housing using adhesive tape.
11. Make sure that the cable [2] can move freely in the pulleys [3] of the pulley supports [1].
12. Install the covers (see Section 5.1.1 - 5.1.3).

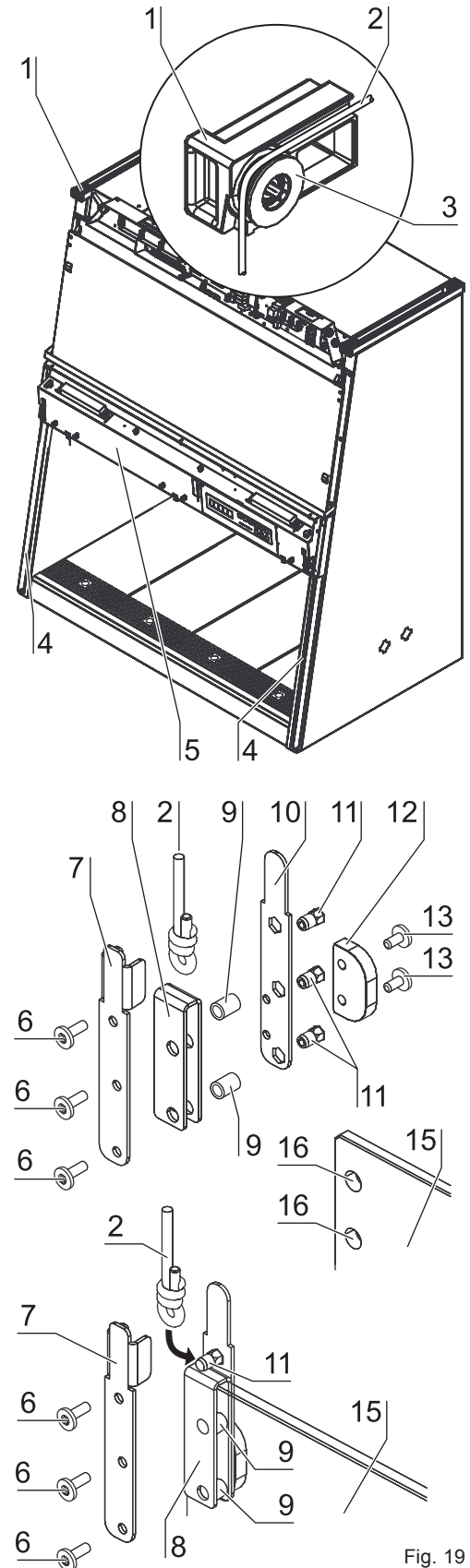


Fig. 19
Front window installation

12. Front window

12.1.4 Replacing the cable

1. Switch the device off, disconnect it from the power supply system, and protect it against accidental reconnection.
2. Remove the light dome (see Section 5.1.1).
3. Remove the front cover (see Section 5.1.2).
4. Lower the front window beyond the closing position.
5. Secure the counterweight at the device backpanel in the transport protection by installing the four transport protection retaining screws.



NOTE - Front window protection!

To prevent the front window from accidentally detaching from the frame, the window must be secured before the two cable protections are removed.

- Support front window from below.
- Secure the sides to the device housing using adhesive tape.

6. **Fig. 20:** Disconnect the cable [2] from the window bracket [4] (see Section 12.1.1).
7. Remove the cable [2] from the counterweight [5] by removing the two retaining screws [9] and sliding the safety plate [8] down. Disconnect the cable from the counterweight pivot [6]. The edge protector [7] will be reused for cable installation.
9. Make sure that the new cable has exactly the same length as the old one.
10. Insert the cable [2] into the pulleys [3] and make sure that it can move freely in the pulleys [3] of the pulley supports [1].
11. Connect the cable [2] to the window bracket [4] (see Section 12.1.2).
12. Connect the cable to the counterweight by installing the edge protector around the pivot [6] and around the safety plate [8].
Connect the cable to the pivot and secure it using the safety plate. Push the safety plate up tautly to the stop and secure it using the two retaining screws [9].
13. Remove the adhesive tape and the front window support.



NOTE - Checking the front window free movement!

Check the free movement of the front window and the switchpoint function several times:

- Safe work positions.
- Window closed position.

The switchpoints must not change (see Section 12.4).

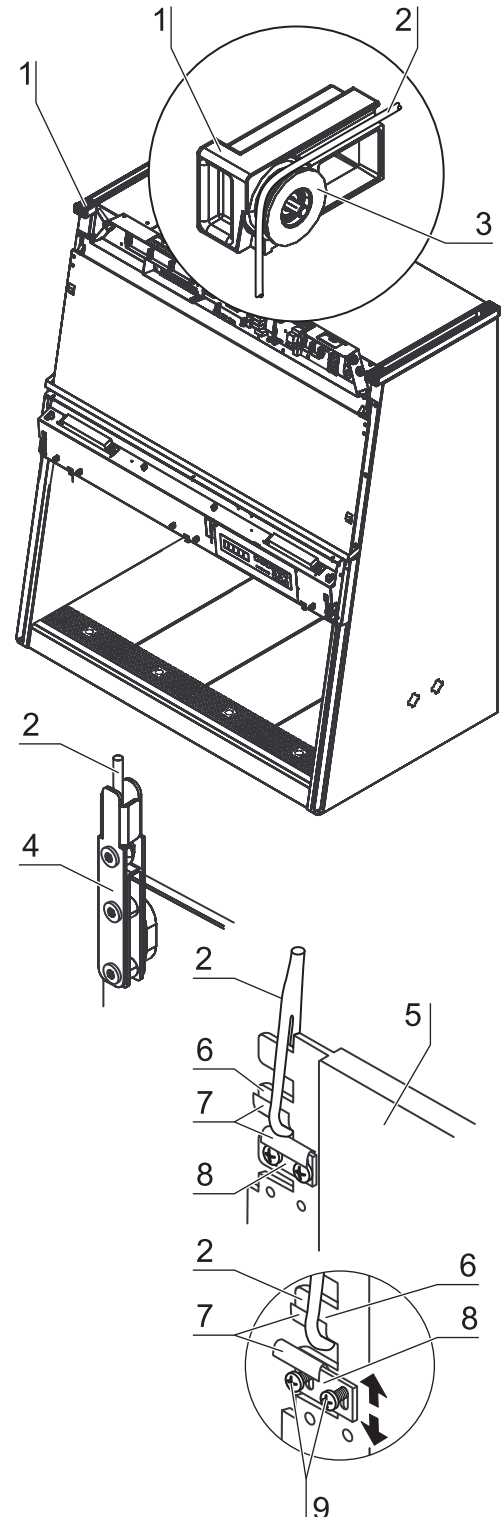


Fig. 20
Cable replacement

12. Front window

12.2 Replacing the front window handles

Fig. 21: Each handle consists of two components:

- a baseplate [1] and
- the gripping section [3].

The baseplates are attached to the front window [5] with self-adhesive foil.

The gripping section is secured to the baseplate by engaging the locking tabs [4] in the recesses [2].

Replacing the gripping section:

1. **Fig. 21:** Slide the gripping section [3] to the center of the front window [5].
2. Slide the replacement gripping section onto the baseplate so that the locking tabs [4] engage in the recesses [2].

Replacing the baseplate:

1. Remove the gripping section.
2. Mark the position of the baseplate [1] on the front window [5].
3. Remove the baseplate [1] from the front window using a putty knife.
4. Clean the contact area thoroughly. Remove all self-adhesive foil residues. The contact face must be absolutely dust- and grease-free.
5. Remove the backing paper and align the baseplate [1] so that the recesses [2] of the locking tab face the center of the front window.
6. Position the baseplate with one of its vertical edges at the position marking and press it firmly against the front window.
7. Slide the replacement gripping section onto the baseplate so that the locking tabs [4] engage in the recesses [2].

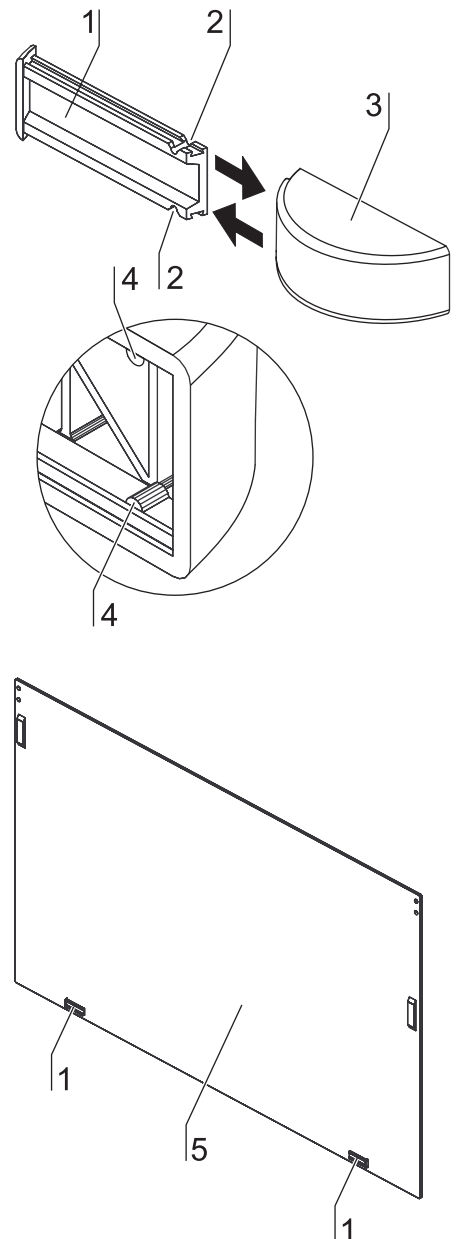


Fig. 21
Handle replacement

12. Front window

12.3 Replacing the position switches

Item 680 (position switch with roller lever)

Fig. 22: Device functions that depend on the individual front window position are controlled by position switches.

- The position switch [8] for reduced ventilation is activated at position [2] by the switching cam [1].
- The two position switches [5] and [6] for the safe work position of the front window are activated at position [4] by the switch cam [7].

Each position switch [13] is secured with two retaining screws [14] through a web plate [9] to a bracket [10] at the mounting frame [3].

The hole [12] is the centre of rotation for the position switch, the slot [11] indicates the setting range.

Setting the switchpoint for reduced ventilation at position [2]:

1. Lower the front window until the sample chamber is completely closed.
2. Remove both retaining screws and set the switchpoint by rotating the position switch [8]. The switch contact must be closed at the peak of the switching cam [1].
3. Tighten both retaining screws.

Setting the switchpoint for safe work position at position [4]:

For safety reasons, the switchpoint for the safe work position of the front window is controlled by two identical position switches [5] and [6] that are installed one on top of the other.

1. Move the window to the safe work position; the opening height must be 200 mm.
2. Remove the retaining screws of both position switches and set the switchpoints by rotating the position switches. The switch contacts of both position switches must be closed at the peak of the switching cam [7].



NOTE - Function test!

Move the front window several times and check the function of the position switches at the individual positions.

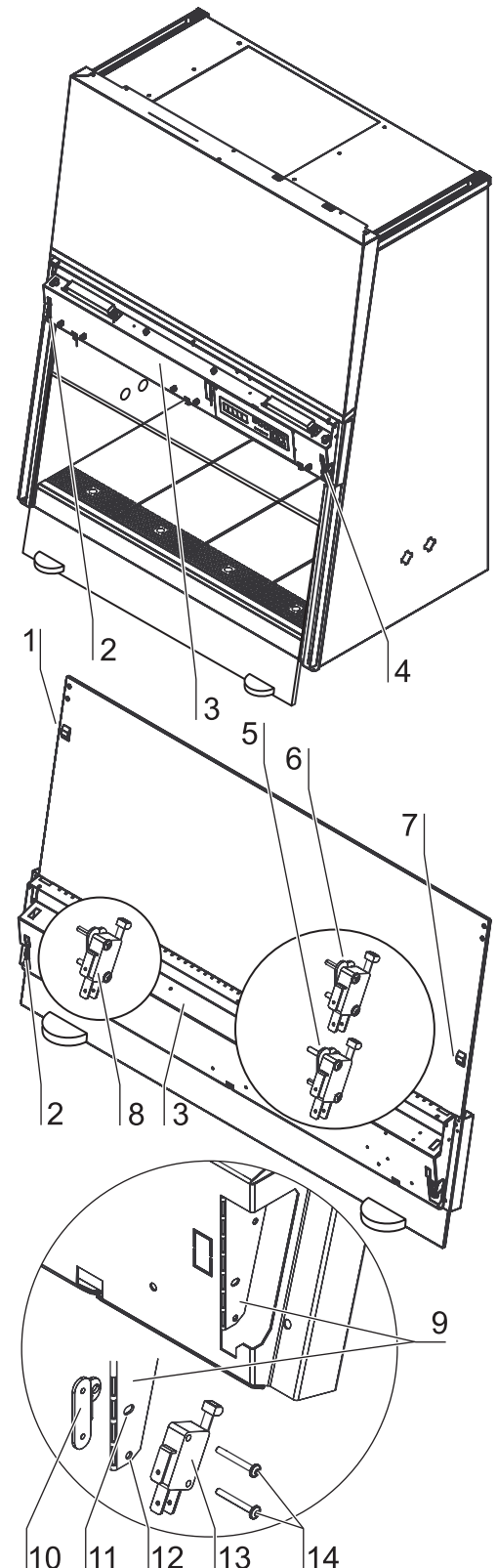


Fig. 22
Position switches

13. Control box components

13.1 Replacing control box electrical components

Item 690 (wiring diagram)
 Item 700 (connection scheme)
 Item 710-720 (power supply cables)
 Item 730 (power supply unit)
 Item 740-750 (main PCB / replacement)
 Item 760 (screw coupling for D-SUB interface)
 Item 770-780 (strain relief alarm output/power supply input)
 Item 790-800 (fuse cartridges)
 Item 810 (IC EPROM MSC VST REPLACEMENT)
 Item 820-870 (wire sets)
 Item 430 (patch cable)

Fig. 23: The control box [1] is located at the top of the device front and is accessible after the front bezel has been removed. The left section of the control box contains the power supply units:

- MSC 1.2 is operated with one power supply unit [2],
- MSC 1.8 is equipped with two power supply units [2] and [3].

The right section of the control box houses the main PCB [5]. The top of the control box contains an RS 232 interface [6] and the fuse holders [4] for the two fuses of the device-integral power supply system.

- Applicability of EU: IEC 1010-1 / EN 61010-1
 Power supply connection: 230 V ~ / PE 50 Hz
 One-site fusing: T 16A



NOTE – Setting parameters!

After the PCB and/or the EPROM has been replaced, the values of S01 to S04 must be checked and set again, and a current calibration has to be performed in S14 (see Section 14.2.2).

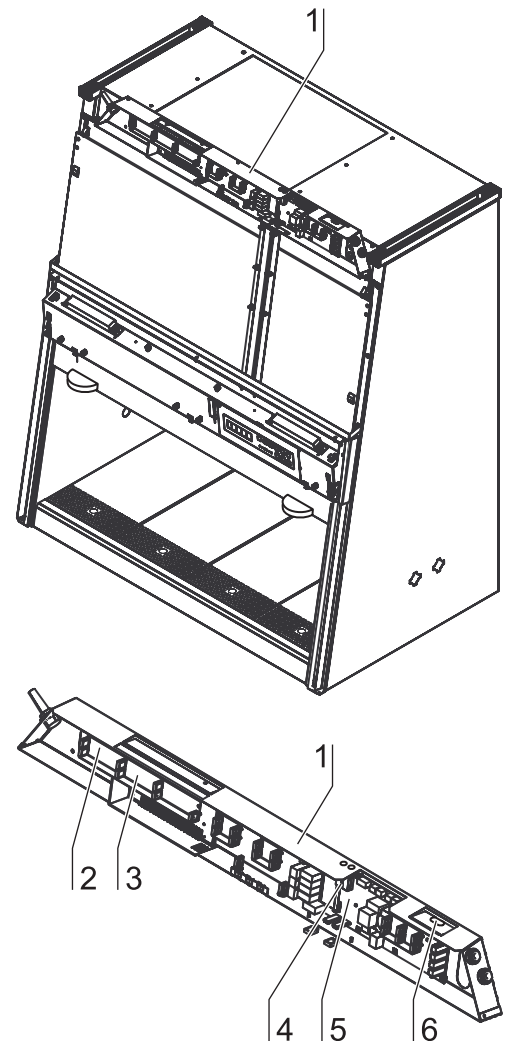


Fig. 23
Control box electrical components

13. Control box components

13.2 Connecting alarm contacts

The device can be connected to an external alarm system with two different connection configurations at the PCB.

Fig. 24: Potential-free contact (ventilation):
Control of external exhaust systems.

- Contact open: The device does not deliver exhaust air.
- Contact closed: The device delivers exhaust air.

Fig. 25: Potential-free contact (monitor alarm):

The external alarm system is connected to the safety cabinet control system. Upon failures of the airflow system, an alarm message is sent to the external alarm system. This function is only enabled when the device is operated in the safe work mode.

This contact is also used when a solenoid valve for the internal gas supply of the safety cabinet is to be connected.

C Communication
R Reduced operation
N Normal operation

Circuit	Voltage	External fusing
Circuits with system voltage	max. 250 V ~	max. 6 A
SELV circuits (cf. VDE 0100, Part 410)	25 V ~	max. 2 A
	60 V =	max. 1 A
SELV-E circuits (cf. VDE 0100, Part 410)	50 V ~	max. 1 A
	120 V =	max. 0.5 A

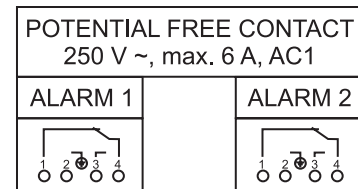


Fig. 24
Contact function

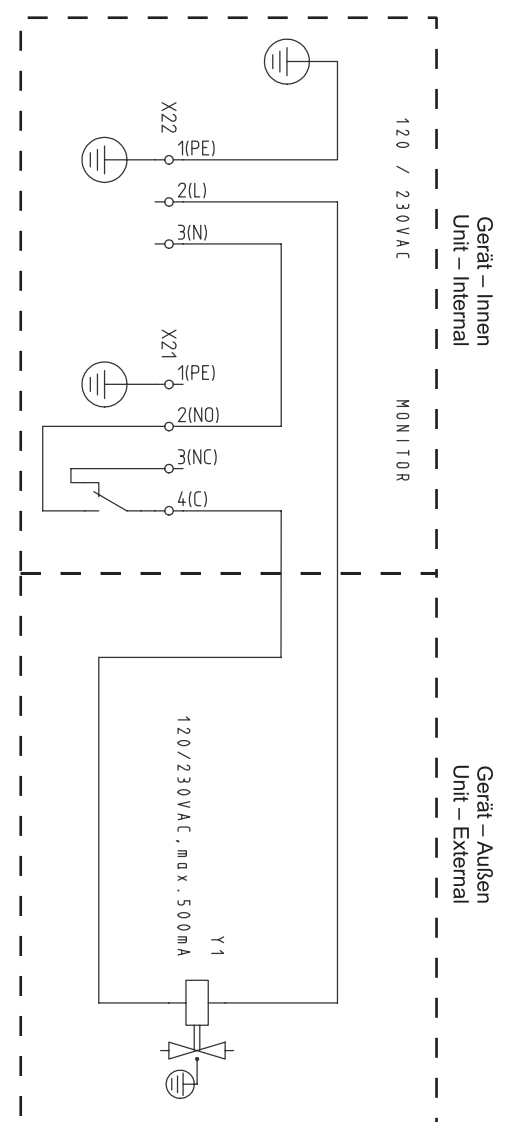


Fig. 25
Control of external exhaust systems

14. Device control programming

14.1 Program structure

The configuration of the device control consists of a programming level, the:

- service level with 14 submenus S01 - S14

Service level

Use the service level for settings that relate to the security functions of the device. The behavior of the functional units for the protection of property and for the safety of the personnel can be altered within the specified value ranges.

Current calibration:

This function must be performed after the exhaust blower main PCB or the EPROM has been replaced. The function is selected via service level S14. After the functional level has been selected, the test starts automatically and the blowers are disabled. After a waiting period of one minute, the display shows *SE*. If this display is confirmed, the currently measured value is saved as parameter **S14** and the blowers are reenabled.

Setting S01 and S02:

For the initial operation, the downflow air and exhaust air operating points must be calibrated in the safety cabinet by selecting parameter S01 or S02 in the parameter level. Then, the desired airflow velocity (parameter values between 0 and 100 %) is selected via the display with the use of external measuring devices. If the desired airflow velocity is reached, this operating point is saved after an automatic waiting period (countdown in display).

Setting S03 and S04:

As for S01 and S02, the desired airflow velocity at the lower limit is selected via the display with the use of external measuring devices. If the desired airflow velocity is reached, this operating point is saved after an automatic waiting period (countdown in display).

Calibration function (Autocal):

The Autocal function redetermines the operating points (S01 – S04) at the location of the device. It is activated at the factory prior to delivery and starts automatically when the safety cabinet is switched on for the first time.

The activation is performed using parameter **S07**. The following values are possible:

- 0 No activation of Autocal function
- 1 Complete Autocal function (measurement S01-S04)
- 2 Short Autocal function (measurement S01 and S02, calculation S03 and S04)

The function can be interrupted at any time by re-entering the OFF mode. When the cabinet is switched back on, the Autocal function starts again. To deactivate the Autocal function, press the **AUDIBLE ALARM ACKNOWLEDGEMENT** key for more than 10 seconds. This will set parameter **S07** to 0 so that the function starts no longer when the cabinet is switched on the next time.

14. Device control programming

14.2 Service level

The service software consists of 14 functional levels. Each level addresses one specific device function by changing and saving the pertaining parameter values.



NOTE – Alarm signals!

No audible signals are issued during programming on the service level.

14.2.1 Service level overview

Overview of the available service level functions and of the pertaining specified value ranges.

Level	Function	Values
S01	Set nominal value for downflow blower	1 - 100 %
S02	Set nominal value for exhaust blower	1 - 100 %
S03	Set downflow velocity at lower alarm limit	1 - 100 %
S04	Set exhaust airflow velocity at lower alarm limit	1 - 100 %
S05	Display total operating hours (h/10)	–
S06	Display total operating hours (h/10)	–
S07	Calibration routine (Autocal)	0 - 2
S08	Version number output (*10)	–
S09	Audible alarm acknowledgement	0: not acknowledgable 1: acknowledgable 2: no audible alarm
S10	Blower motor start time (do not change)	0 - 60
S11	Display content	0: operating hours only 1: manual change between operating hours and display of exhaust and downflow velocities 2: automatic change 3: simultaneous display of exhaust and downflow velocities
S12	KI disk value	0 - 100
S13	UV lamp	0: no UV lamp 1: UV lamp installed
S14	No-load current [mA] (do not change)	0 - 5000

*Note device nameplate!

14. Device control programming

14.2.2 Service level settings

The service level is selected from the operator level. The display panel shows the current state of navigation as an alphanumeric combination (S indicates the service level, 01 indicates the first of 14 functional levels).

When the value input of a service level is activated, the previously set value flashes on the display panel.

1. To go from the operator level to the service level:
 Keep the two keys
AUDIBLE ALARM ACKNOWLEDGMENT
SAMPLE CHAMBER ILLUMINATION ON / OFF
 depressed for approx 10 seconds
2. To scroll through service levels:
 forward: Press the **INTERNAL OUTLET ON / OFF** key
 backward: Press the **SAMPLE CHAMBER ILLUMINATION ON / OFF** key
3. To activate the value input of a service level:
 Press the **ON, DEVICE ON / OFF** key
 The preset value flashes.
4. To increase a value in increments:
 Press the **INTERNAL OUTLET ON / OFF** key
5. To reduce a value in increments:
 Press the **SAMPLE CHAMBER ILLUMINATION ON / OFF** key
6. To save the input value:
 Press the **ON, DEVICE ON / OFF** key
 If the setting is not saved, the input is reset to the original value after approx 15 seconds.
7. To return from the service level to the operator level:
 Press the **AUDIBLE ALARM ACKNOWLEDGMENT** key

To perform a current calibration:

1. Switch the device on and move the front window to the working position.
2. If an external exhaust system is used, isolate it or switch it off.
3. Select parameter S14.
4. Wait for countdown and save when **SE** is displayed.



NOTE – Blowers!

The device control switches the blowers off when S14 is selected and back on after saving.

14. Device control programming

14.2.3 Overview of key functions in individual operating modes

Key / Function	Off mode	Safe work	Move front window	Front window closed
On / Off				
Switch device on	Yes	No	No	No
Switch device off	No	No	No	Yes
Audible alarm acknowledgment				
Silence alarm signal (when alarm is active)	Yes	Yes	Yes	Yes
Active alarm				
Deactivate calibration function*	Yes	No	No	No
Move to service level *	No	Yes	Yes	Yes
* possible only when no alarm is active				
Scroll display				
Select operating hours,	No	Yes	No	No
Downflow, Inflow				
Outlets				
Switch outlets on and off	Yes	Yes	Yes	Yes
Illumination				
Switch illumination on and off	Yes	Yes	Yes	Yes
UV disinfection				
Start and stop disinfection	No	No	No	Yes
Request / set disinfection time	Yes	Yes	Yes	No

14.3 Error messages on the display

Error message:

ER 05: Memory data were rewritten.

Repair measures:

- Check air velocities and save values for S1 to S4 again.
If the failure continues to exist, replace the main PCB (see Section 13.1).

Error message:

ER 06: Faulty data transmission.

Repair measures:

- Check connections between display and main PCB as well as connecting cable.
- Disconnect and reconnect connecting cable on both ends, replace cable or PCBs as required (see Section 13.1).

15. Auto-calibration routine

15.1 Function of the auto-calibration routine

You can use the auto-calibration routine to automatically approach the air velocities and alarm limits determined during the factory test or the values of a standard parameter set determined during comparison tests.

The pressures measured by the sensors are saved and used for the alarm output.

An auto-calibration routine runs approx 30 minutes.

Depending on the value set in S07 on the service level, two different functions of the auto-calibration routine can be selected.

Parameter value S07 = 1:

The values for exhaust air and downflow air determined during the factory test as well as their alarm limits (in accordance with EN12469) are approached and the pertaining pressure values are saved.

Parameter value S07 = 2:

The stored values for exhaust air and downflow air are approached and the pressure values are saved. The values for the alarm limits are calculated and stored according to the measured exhaust air and downflow values.



NOTE – Auto-calibration routine!

In accordance with national standards and regulations, the auto-calibration routine is not a substitute for a start-up by an authorized service technician.

The values determined during the auto-calibration routine must be verified by an installation test upon the initial operation and after service or repair works.

15.2 Performing the auto-calibration routine

15.2.1 Starting the auto-calibration routine

Upon delivery, the device is in the OFF mode.

1. Connect the device to the power supply system:

The display shows a dot.

2. Switch the device on:

The device control changes to standby mode. The display shows *CAL*.

The auto-calibration routine starts as soon as the front window is moved to the working position or if the device is in the working mode and the pressures measured by the sensors are within the specified ranges. The blowers run with the stored values and the display alternately shows *CAL* and the remaining time of the auto-calibration routine.

15. Auto-calibration routine

15.2.2 Automatic cancellation of the auto-calibration routine

During the first minutes after the auto-calibration routine has started, pressure values are determined. When the measured deviation of these averages exceeds the set value or if the front window is moved out of the working position, the auto-calibration routine is interrupted and will be resumed only after the start conditions described in Section 2 have been complied with.

15.2.3 Manual interruption of the auto-calibration routine

- Close the front window.
- Keep the **ON** key depressed until the safety cabinet is in the OFF mode.

15.2.4 Manual cancellation of the auto-calibration routine

After a complete cancellation, the auto-calibration routine will no longer start automatically. To cancel the auto-calibration routine completely:

- Close the front window.
- Keep the **ON** key depressed until the safety cabinet is in the OFF mode.
- Keep the **AUDIBLE ALARM ACKNOWLEDGMENT** key depressed until a short audible signal sounds.

15.2.5 Manual start of the auto-calibration routine

A restart of the auto-calibration routine after a cancellation is only possible by:

- Changing and storing parameter S07 in the service level from 0 to 1 or 2.
- Power reset (disconnect the device from the power supply system, reconnect it, and switch it on).

The auto-calibration routine will restart if the start conditions are complied with (see Section 15.2.1).

15.2.6 Failures upon starting the auto-calibration routine:

The auto-calibration routine must start automatically within 5 minutes after the device has been switched on. The following failures can prevent a start:

- The airflow is impaired by objects in the sample chamber.
- The exhaust aperture of the exhaust filter is blocked.
- The distance between the exhaust filter and the ceiling of the room where the device is located is insufficient.
- The workplates are not installed properly.

A. Installation test / Repeat test

A.1 Classification of the safety cabinet

For application in the EU, the device has been rated as a Class II microbiological safety cabinet in accordance with EN 12469.

For operation as a device of said classifications, an installation test or repeat test in accordance with EN 12469 must be conducted:

- After the final installation before the safety cabinet is operated.
- During the annual inspection.
- After any replacement of the downflow filter.
- After any replacement of the exhaust filter.
- After any repairs to the air distribution system.
- After any relocation of the device to a new location.

When working with safety-critical materials (toxic or slightly radio-active substances), the on-site tests should be conducted at shorter intervals (every three or six months).

A.2 Test terms

Nominal value:

Default value as specified by Thermo Electron LED.

Measured value:

Value measured at the location of the safety cabinet.

Tolerance:

Acceptable deviation from the nominal value.

Average value:

The sum of the measuring values divided by the number of tests. The average value is compared to the nominal value.

Setpoint:

Acceptable operating value for the inflow and downflow velocities.

Inflow velocity (m/s):

Velocity of the air entering the sample chamber opening.

Downflow velocity (m/s):

Velocity of the displacement flow circulating through the work chamber.

Exhaust velocity (m/s):

Velocity of the airflow discharged through the exhaust filter opening.

Exhaust airflow volume (m³/s):

Amount of air discharged at the exhaust filter.

A. Installation test / Repeat test**A.3 Extent of the tests**

The tests cover all essential safety functions of the device as all values measured at the location of the device are compared to the nominal values. If required, device settings must be changed or the safety cabinet must be modified for the compliance with the nominal value tolerances. Possible measures are listed under **Repair measures** at the end of each section.

The tests should be conducted in the following sequence:

- Electrical safety test in accordance with applicable national regulations
- HEPA filter leak test
- Inflow velocity test
- Downflow velocity test
- Exhaust airflow volume test
- Airflow pattern test (optional test)
- Noise level test
- Lighting intensity test
- Vibration test
- UV intensity test
- Monitoring device test
- Front window functional test

**NOTE - Test report!**

All tests require a test report in duplicate. The operator must receive one copy of the report. A sample test report is attached at the end of this section.

A. Installation test / Repeat test

A.4 Testing equipment

For the conduction of the tests, Thermo Electron LED recommend testing equipment of the manufacturers listed below.

Testing equipment	Manufacturer	Application
Smoke tubes	Dräger GmbH Lübeck, Germany	Airflow pattern test
Anemometer	TSI / Technetics Freiburg, Germany	Measuring of airflow velocity
Multimeter	Gossen-Metrawatt XY, Germany	Electrical leakage and ground resistance tests
Laser particle counter	MT Messtechnik GmbH Adelzhausen, Germany	Filter leakage test
Aerosol Generator	LMT Lichtmesstechnik GmbH Berlin, Germany	Generation of aerosol mist
Dilution range	LMT Lichtmesstechnik GmbH Berlin, Germany	Diluting of aerosol mist
UV meter	UV-Elektronik GmbH Ettlingen, Germany	Measuring of aerosol mist
Luxmeter	LMT Lichtmesstechnik GmbH Berlin, Germany	Lighting intensity test
Vibration meter	Airflow Lufttechnik GmbH Rheinhausen, Germany	Vibration intensity test
Heating device	Foramaflo Ltd Windlesham, England	Disinfection with gas, vaporization of formaldehyde solution and aqua ammonia

A. Installation test / Repeat test**A.5 Electrical safety test****Purpose of the test:**

This test is conducted to check the electrical safety after the cabinet has been installed and during the annual safety inspection. The following is tested:

- ▶ EU applicability (EN 12469):
 - PE conductor resistance
 - Leakage current test

Test conditions

The test is conducted in accordance with the following guidelines:

- ▶ Application in EU: IEC 61010-1,
- ▶ All other applications in accordance with applicable national regulations.

Testing equipment

- ▶ EU applicability (EN 12469):
 - Testing equipment in accordance with IEC 1010-1 or EN 61010-1 or in accordance with applicable national regulations.

Accessories

Adapter with 3-hole electrical receptacle on one end and 2-prong plug on the other end.

Calibration of the testing equipment

Calibration performed by manufacturer.

A. Testing for electrical leakage

1. Switch the device to the off mode, deenergize the illumination and the internal power supply.
2. Plug the ESA power plug into the outlet of the power supply.
3. Connect the safety cabinet power plug to the ESA leak current adapter.
4. Turn the ESA function selector to the microamp (mA) scale. Read and record the displayed value.
5. Switch the safety cabinet on, then read and record the displayed measured value.

A. Installation test / Repeat test**B. Testing for ground circuit resistance**

1. Switch all electrical switches of the safety cabinet to position **OFF**.
2. Plug the ESA power plug into the outlet of the power supply.
3. Connect the safety cabinet power plug to the ESA ground circuit resistance adapter.
4. Read and record the displayed value.

Acceptable values for all applications (in accordance with EN 61010)

The measured electrical leakage must not exceed 3.5 mA, and the cabinet ground circuit resistance must not exceed 0.1 Ω .

Repair measures

- **Leakage detected:** Check the cables and terminal clamps of the device-internal power supply and of the safety cabinet.
- **Ground resistance not correct:** Check the power supply lines at the location of the device.
- **Ground faults detected:** Check the device grounding and the power supply lines at the location of the safety cabinet.

A. Installation test / Repeat test**A.6 HEPA filter leak test****Purpose of the test**

This test is conducted to check the HEPA downflow and exhaust filters, the filter housings, and the mounting frames for possible leakage.

Testing equipment

Aerosol photometer with linear or extended logarithmic scale or particle counter for individual particles.

Calibration of the testing equipment

Calibration in accordance with the manufacturer's instructions or in accordance with the requirements of IES-RP-CC-013-86T (Institute of Environmental Sciences, Mt. Prospect, Illinois).

Measuring accuracy of the testing equipment

- ▶ EU applicability (EN 12469):
 - Particle counter for individual particles with a dilution range capable of detecting a penetration of 0.01 % or less of particles exceeding 0.3 µmor
 - aerosol photometer with an upper measuring threshold of 10 µg/l - 100 µg/l at a measurement range of no fewer than 5 logarithmic concentration levels.

Accessories

Aerosol generator / Dilution range.

Test conditions

The sample chamber of the safety cabinet must be completely empty, windows and doors of the operating room must be closed (no draft).

A. Installation test / Repeat test

1. **Fig. A1:** Route the hose [5] of the aerosol generator [6] so that the aerosoles are supplied to the downflow upward air-flow.
2. Connect the **Supply** test hose [2] of the downflow unit to the connecting hose [3] of the testing equipment [4].



NOTE - Alarm monitor suppression!

Go to service level S01 or S02:

- **Keep the AUDIBLE ALARM ACKNOWLEDGMENT key depressed.**

After completion of the measurement, exit the service level without requesting the store function.

3. Switch the aerosol generator on.
4. Measure the concentration of the aerosol-generated air (P_{max}).
5. With a dilution range of 1:100 or 1:1000, measure the aerosol concentration using the testing equipment [4] and check to see if the light-scattering intensity corresponds with the comparison measurement:
 - within a range of 10 µg/l - 100 µg/l / EN 12469 / DIN 12980
6. Scan the discharge side of the downflow filter at a distance of 2.5 cm (1 in) to the filter surface in slightly overlapping measuring strokes. The scan speed should not exceed 5 cm/s (2 in/s).
7. Connect the **Exhaust** test hose [9] at the right side [7] of the exhaust unit to the connecting hose [3] of the testing equipment [4].
8. Scan the outside-oriented discharge surface of the downflow filter above the exhaust aperture [1] at a distance of 2.5 cm (1 in) to the filter surface in slightly overlapping measuring strokes. The scan speed should not exceed 5 cm/s (2 in/s).
9. Measure the concentration of the aerosol-generated air (P_{max}).

Acceptable values

- EU applicability (EN 12469):
 - The discharged amount of aerosoles of the aerosol-generated air concentration must not exceed 0.001 %.
 - When using testing equipment of Air Techniques ATI, the displayed value must not exceed 0.01 %.

Repair measurements

- Replace downflow filter.
- Replace exhaust filter.

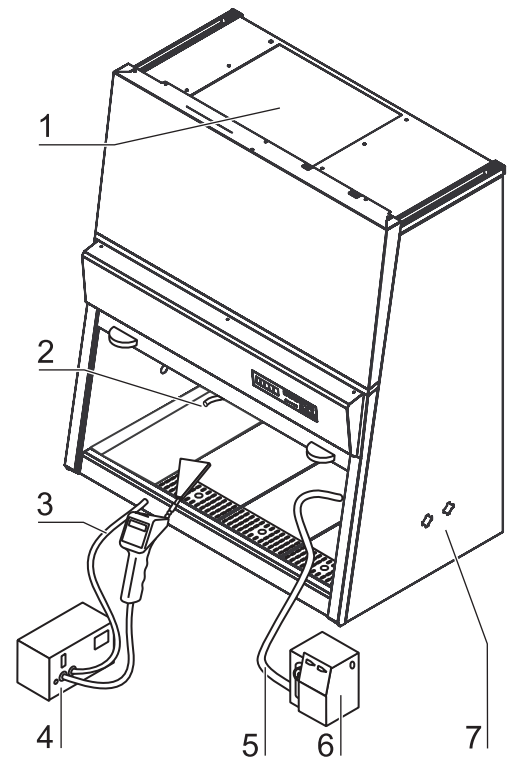


Fig. A1
HEPA filter leak test

A. Installation test / Repeat test

A.7 Inflow velocity test

Purpose of the test

This test is conducted to determine the nominal value of the inflow velocity.

Value to be determined

Inflow velocity V_1 .

Test methods

- EU applicability (EN 12469):
 - The inflow velocity (V_1) is calculated using the values of the exhaust airflow volume and of the sample chamber inflow surface.
 - If the safety cabinet is connected to a technical ventilation, the inflow velocity can also be measured directly at the work aperture.

Test conditions

For all test methods, the sample chamber of the safety cabinet must be completely empty, windows and doors of the operating room must be closed (no draft)).

A.7.1 Measurement of the inflow velocity in the work aperture (EN 12469)

Fig. A2: The inflow velocity is measured at several measuring points in the work aperture. For this purpose, the front window is moved up to height **F**.

- **F** = 8 cm,

The anemometer is installed directly to the inside of the work aperture front window. The measuring points are located at distance **C** of 4 cm immediately at the inside of the front window lower edge and at distance **B** of 10 cm to each other. The lateral distance to the work aperture edges is also 10 cm.

Testing equipment

Anemometer

Calibration of the testing equipment

The anemometer must be calibrated in accordance with the manufacturer's instructions or in wind tunnel tests.

A. Installation test / Repeat test

Fig. A2: Test measurement

1. Install the testing equipment.
2. Move the front window [1] to the measurement position and operate the air system blower for approx 20 minutes.
3. Perform the measurements.
4. Evaluate the individual measurements.

Calculating the average value for inflow velocity V_1

$$\text{Average} = \frac{\text{Sum of measuring values}}{\text{Number of measuring points}} / 2.5$$

Acceptable values

- EU applicability (EN 12469):
 - The nominal value is 0.45 m/s.
 - The average value of the inflow velocity (V_1) must be within $\pm 10\%$ of the nominal value.

Repair measures

- Adjust the exhaust blower speed by changing value S02 (see Section 14.1)
- Check the exhaust blower control voltage at main PCB. The control voltage in the value range of 0-10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in S02.
- Replace the exhaust filter.
- Check the installed exhaust system for correct function. If installed, change the size of the draft interruptor or check the exhaust plenum (air door) for correct function.

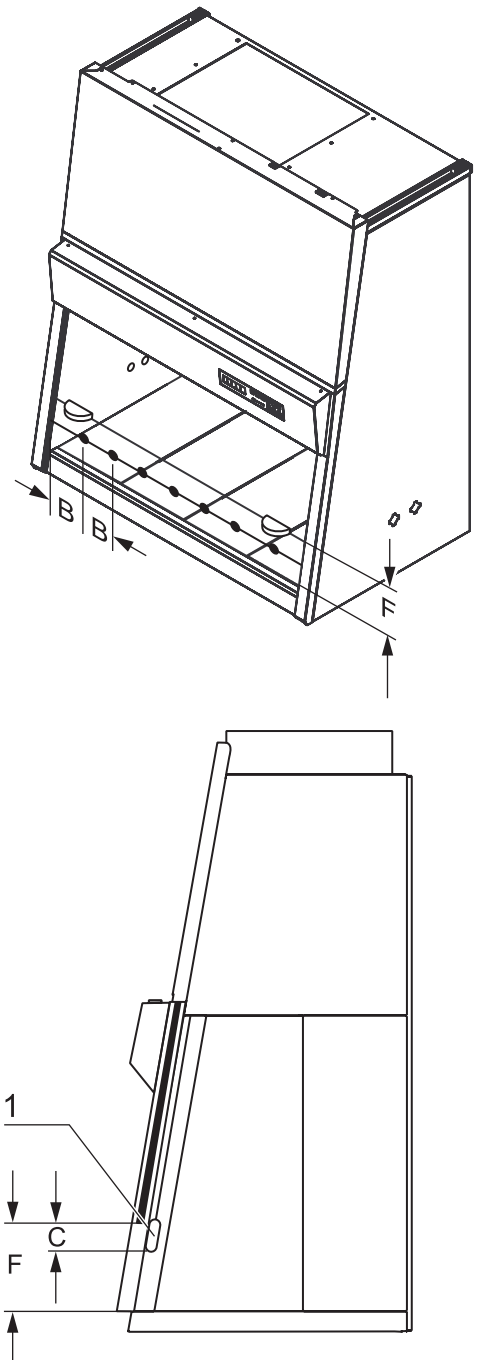


Fig. A2
Air inflow velocity test grid

A. Installation test / Repeat test

A.7.2 Calculation of the inflow velocity (EN 12469 / DIN 12980)

The average inflow velocity (V_1) is calculated from the average value of the directly measured exhaust velocity (V_2) and the relation between discharge surface and inflow surface.

Default values

Default values are the discharge surface of the downflow filter A_1 and the actual device-specific air inflow surface A_2 (work aperture surface).

MSC 1.2 Exhaust filter discharge surface $A_1 = 0.246 \text{ m}^2$
 Actual air inflow surface $A_2 = 0.240 \text{ m}^2$

MSC 1.8 Exhaust filter discharge surface $A_1 = 0.375 \text{ m}^2$
 Actual air inflow surface $A_2 = 0.360 \text{ m}^2$

Values to be measured

Direct exhaust velocity V_3 measured at nine measuring points.

Values to be calculated

Average value for exhaust velocity V_2

Exhaust airflow volume R_1

Average value for inflow velocity V_1

Test grid above the exhaust aperture

Fig. A3: The direct exhaust velocity (V_3) is measured using an anemometer at distance H of 10 cm above the exhaust aperture. The dimensions of the exhaust aperture are:

MSC 1.2 57.8 x 42.5 cm²
 MSC 1.8 88.3 x 42.5 cm²

Nine measuring points are located along width B at an even distance of D to each other and to the lateral edges of the exhaust aperture.

MSC 1.2 14.5 cm
 MSC 1.8 22.5 cm

The measuring points along depth T are located at an even distance of $C = 10.7 \text{ cm}$ to each other and to the lateral edges of the exhaust aperture.

Test measurement

1. Install the testing equipment to the test grid.
2. Move the front window to working position **A** and operate the air system blowers for approx 20 min.
3. Perform measurement at all nine measuring points above the exhaust aperture for a minimum of one minute for each measuring point.
4. Evaluate the individual measurements

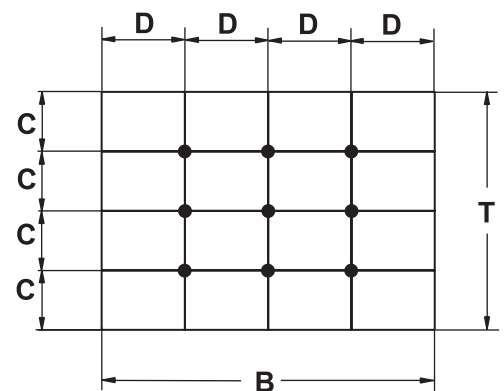
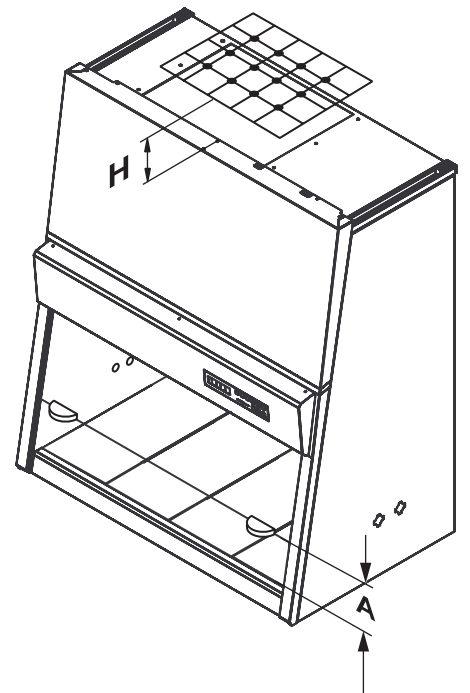


Fig. A3
 Test grid above the exhaust aperture

A. Installation test / Repeat test

Calculating the average value for the exhaust velocity V_2

$$\text{Average value } (V_2) = \frac{\text{Sum of directly measured values}}{\text{Number of measuring points}}$$

Calculating the average value for the inflow velocity V_1 (m/s)

$$V_1 \times A_1 = V_2 \times A_2$$

Acceptable values

- EU applicability (EN 12469):
 - The nominal value is 0.45 m/s.
 - The average value of the inflow velocity (V_1) must be within $\pm 10\%$ of the nominal value.

Repair measures

- Adjust the exhaust blower speed by changing value S02 (see Section 14.3)
- Check the exhaust blower control voltage at main PCB. The control voltage in the value range of 0-10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in S02.
- Replace the exhaust filter.
- Check the installed exhaust system for correct function. If installed, change the size of the draft interruptor or check the exhaust plenum (air door) for correct function.

A.7.3 Exhaust airflow volume test

To calculate the exhaust airflow volume (R_1), multiply the average value for the exhaust velocity (V_2) with the actual discharge area of the exhaust filter (A_2).

Calculating the exhaust airflow volume R_1 (m³/h)

$$R_1 = V_2 \times A_2$$

- EU applicability (EN 12469 / DIN 12980):

- MSC 1.2 390 m³/h
- MSC 1.8 585 m³/h

Repair measures

- Adjust the exhaust blower speed by changing value S02 (see Section 14.3)
- Check the exhaust blower control voltage at main PCB. The control voltage in the value range of 0 - 10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in S02.
- Replace the exhaust filter.
- If installed, check the function of the technical ventilation system.

A. Installation test / Repeat test

A.8 Downflow velocity test

Purpose of the test

This test is conducted to check the nominal value of the downflow velocity (displacement airflow) in the work area of the safety cabinet.

Testing equipment

Anemometer

Calibration of the testing equipment

The anemometer must be calibrated in accordance with the manufacturer's instructions

Accuracy of the testing equipment

Accuracy of ± 0.01 m/s or a maximal deviation of 3 % from the indicated airflow velocity.

Test conditions

The sample chamber of the safety cabinet must be completely empty, windows and doors of the operating room must be closed (no draft).

The thermoanometer measuring head must be secured tightly at the measuring point to allow accurate measurements.

The distances between the measuring points must be correct, the grid must not be distorted.

Test in accordance with EN 12469

Fig. A4: The device is operated with a uniform displacement airflow. Therefore, the measured values at the individual measuring points must be within 20 % of the average value. The test area above the work surface consists of a rectangular grid that encloses a minimum of 2 measuring rows with 4 measuring points per row:

A = Test area position. The front window is moved to the safe work position. The test area is positioned horizontally at distance **A** above the front window lower edge.

EN 12469: A = 10 cm

L: Sample chamber width, depending on version:

MSC 1.2 = 120 cm

MSC 1.8 = 180 cm

The values of distances **B** and **C** are calculated from the individual sample chamber width.

B = $1/8 \times L$: Distance between test area and sample chamber sidewalls.

C = $2/8 \times L$: Distance between test area and front window

D = 15.75 cm: Distance between test area and work aperture / device rear panel.

E = 31.50 cm: Distance between grid rows.

A. Installation test / Repeat test

Test measurement

1. Switch the device on.
3. Move the front window to the working position. The lead time for the first measurement is 20 min.
3. Install the measuring head to the first measuring point.
4. Perform the measurement at each measuring point for a minimum time of one minute and record the values.
5. Calculate the average value for the downflow velocity.

Calculating the average value

$$\text{Average} = \frac{\text{Sum of measuring values}}{\text{Number of measuring points}}$$

Acceptable values

- EU applicability (EN 12469):
 - The average value must be within $\pm 10\%$ of the nominal value (see Technical Data).
 - The measured values of the individual measuring points must be within 20 % of the average downflow velocity.

Repair measures

- Set the downflow blower speed by changing changing value S01 (see Section 14). The control voltage in the value range of 0 - 10 V changes with the settings in S01. The control voltage of the downflow blower must be coordinated with the settings in S01.



NOTE – Alarm limit setting!

If the values in S01 and/or S02 are changed, the alarm limits in S03 and S04 must be set accordingly. After any change of S01, S02 must be stored again as well.

- Check the downflow blower voltage at the main PCB.
- Replace the downflow filter.

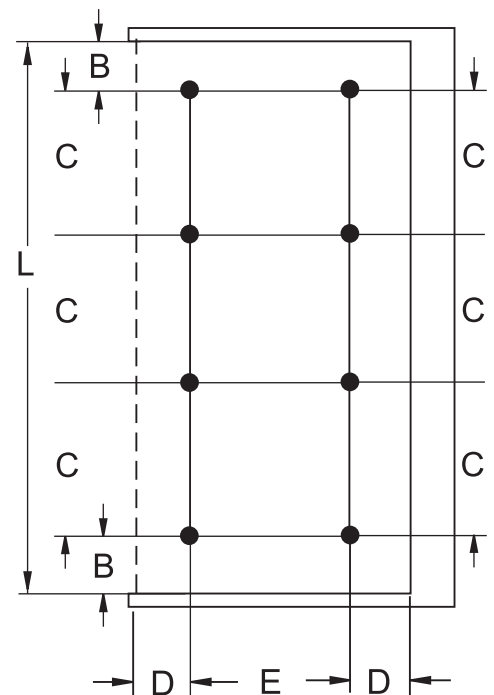
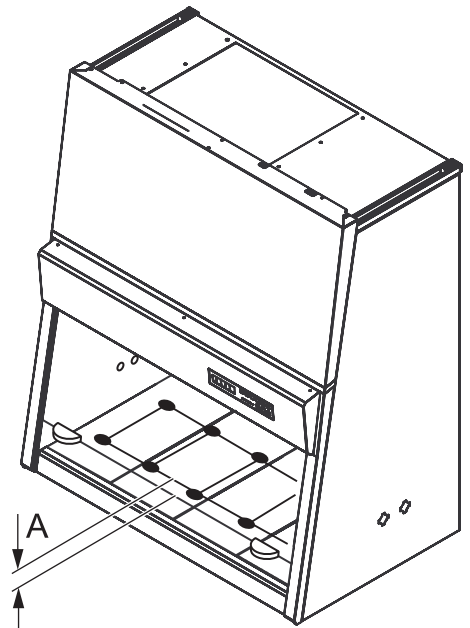


Fig. A4
Downflow velocity test grid
EN 12469

A. Installation test / Repeat test

A.9 Airflow pattern test

Purpose of the test

This test is conducted to check the behavior of the airflows in the sample chamber. Check to see if the displacement airflow passes along the entire work area, if the vertical passage is correct, and if air escapes through joints or seals of the housing and of the front window.

Testing equipment

Smoke tubes.



NOTE – Airflow nominal value!

The individual test sections for airflow patterns can only be performed when the inflow and downflow velocities comply with the nominal value.

A.9.1 Airflow direction test

1. **Fig. A9:** Move the front window to position **A**.
2. Using a smoke tube, scan the work area along its center-line from one end to the other. Hold the smoke tube so that its tip is at distance **B** of approx 15 cm (6 in.) above the work surface.

Acceptable airflow behavior

- EU applicability (EN 12469):
 - The smoke does not move upwards but is removed downward.
 - No smoke escapes through the work aperture.

A.9.2 Leakproofness test for the front window

1. **Fig. A9:** Move the front window to the position **A**.
2. Using a smoke tube, scan the work area at distance **C** of approx 2.5 cm (1 in.) to the front window from one end to the other. Hold the smoke tube so that its tip is approx 15 cm (6 in.) above the work aperture.

Acceptable airflow behavior

- EU applicability (EN 12469):
 - The smoke does not move upwards but is removed downward.
 - No smoke escapes through the work aperture.

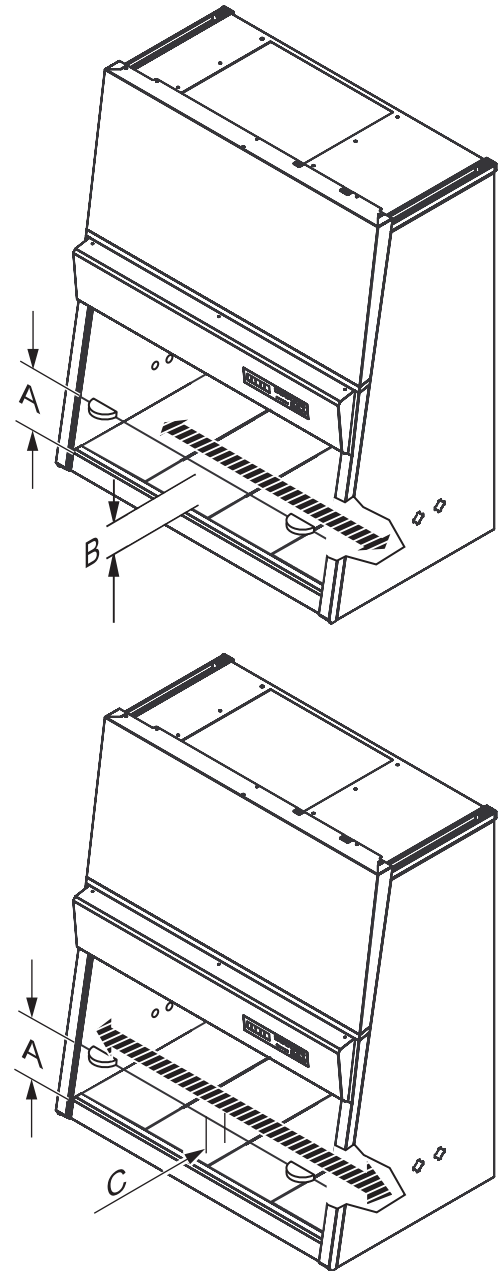


Fig. A5
Airflow pattern I

A. Installation test / Repeat test

A.9.3 Leakproofness test for edges and corners

1. **Fig. A6:** Move the front window to the position **A**.
2. Outside the front side of the sample chamber, pass a smoke tube from one end to the other along the work aperture with particular attention paid to the edges and corners of the work aperture.

Acceptable airflow behavior

- EU applicability (EN 12469):
 - The smoke does not move upwards but is removed downward.
 - No smoke escapes through the work aperture.

A.9.4 Leakproofness test for seals and for the upper closing edge

1. **Fig. A10:** Move the front window to position **A**.
2. From the inside, pass a smoke tube along the window frame seals and along the upper closing edge of the front window.

Acceptable airflow behavior

- EU applicability (EN 12469):
 - The smoke does not move upwards but is removed downward.
 - No smoke escapes through the work aperture.

Repair measures

- If vortexing or dead points occurs in the airflow, check the inflow and downflow setpoints.

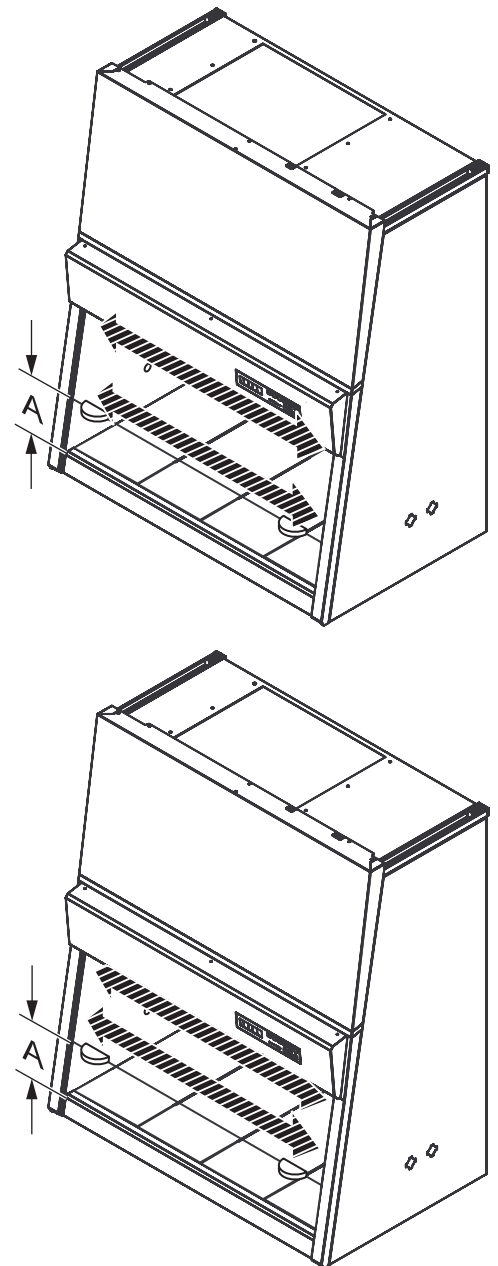


Fig. A6
Airflow pattern II

A. Installation test / Repeat test**A.10 UV intensity test****Purpose of the test**

The power of the UV lamps will be considerably reduced after 1500 operating hours so that an effective UV disinfection is no longer ensured. Conduct this test only at the customer's request.

Test procedure

1. Read the UV operating time value from service level S06 (see Section 14).
2. If the value is just below or over 1500 h, replace all UV lamps.
3. After the UV lamps have been replaced, reset the UV operating time value at service level S06 to zero.

A.11 Setting the monitoring devices

The settings are made on the service level using parameters S03 and S04.

Purpose of the setting

Setting of the sensor response characteristics for downflow velocity and inflow velocity. The alarm values are set so that the visual and audible warnings are issued when the corresponding airflow velocity falls below the lower limit or exceeds the upper limit.

Test conditions

The sample chamber of the safety cabinet must be completely empty, windows and doors of the operating room must be closed (no draft).

Reference values

The nominal values of the control voltage for the downflow and exhaust blowers from service levels S01 and S02 of the device control are used as reference values for setting the alarm values. If the values in S01 or S02 are changed, the alarm limits in S03 and S04 must be adapted in accordance with DIN EN 12469.

A.11.1 Downflow velocity alarm values**► EU applicability (EN 12469):**

- The average airflow velocity must have been determined using an anemometer.

To set the alarm value:

1. Switch the safety cabinet on. The lead time for the setting is approx 20 min.
2. Calculate the average downflow velocity (see Section A.8).
3. Go to service level S03. In S03, change the overall output of the blowers until the lowest velocity of the displacement airflow does not fall below 0.25m/s at any point.

A. **Installation test / Repeat test**

4. Save the input value:
 Wait until the display shows "Set".
 Press the "On" key.

A.11.2 Inflow velocity alarm values

- EU applicability (EN 12469):
 - The average airflow velocity must have been determined using an anemometer.

Setting the alarm value:

1. Switch the safety cabinet on. The lead time for the setting is approx 20 min.
2. Calculate the average inflow velocity (see Section A.7).
3. Go to service level S04. In S04, lower the device overall output until the value is approx 10 % below the determined average value (acceptable minimal value 0.4 m/s).
4. Save the input value:
 Wait until the display shows "Set".
 Press the "On" key.

B.
Decontamination with gas
B.1 Disinfection with formaldehyde

Prior to any repairs in the contaminated area (blower/filter assembly), the device and the filters must be completely decontaminated. Generally, a gas decontamination using formaldehyde is performed.



CAUTION – Dangerous gases!



A disinfection using formaldehyde must be performed in accordance with the specifications of NSF 49/1992, Annex G or EN 12469.

This procedure presents considerable risks and must therefore be performed only by specially trained and authorized service personnel in accordance with applicable national safety regulations (e.g. Germany: TRGS 522)!

B.1.1 Procedure

For gas disinfection, formaldehyde is vaporized within the tightly sealed sample chamber. The quantity of the applied formaldehyde depends on the volume of the sample chamber in the safety cabinet that is to be disinfected (see Technical Data). The formaldehyde evaporates immediately after reaching its boiling point; the minimum reaction time is 6 hours. Therefore, the formaldehyde should be neutralized after the specified reaction time by vaporizing 25 % aqua ammonia (10 ml per cubic meter of sample chamber volume).



CAUTION ! – Fire hazard!



Formaldehyde is flammable. The auto-ignition temperature of formalin is 430 °C (820 °F). With a volume percentage of 7.75 % in dry air, formaldehyde vapor may explode. For vaporization, do not use heating devices reaching temperatures above 250 °C (477 °F).



CAUTION! – Hazardous chemicals!



Formaldehyde in reaction with hydrogen chloride will form BCME which is a hazardous chemical.

When using formaldehyde, all residues of hydrogen chloride in the work chamber of the cabinet must be removed!

B. Decontamination with gas

B.1.2 Performing gas disinfection

► EU applicability (EN 12469)

Ambient conditions

The temperature in the work room should be approximately 21 °C (40 °F); the relative humidity should be between 60 and 85 %.

Accessories

Appliances:

For vaporizing both solutions, an appropriate heating device with thermostat and two separate containers for formaldehyde solution and for aqua ammonia are required.



NOTE – Warning label!

A warning label should be attached to the safety cabinet during the vaporization process.

Formaldehyde solution (20 %):

On the basis of the calculated safety cabinet volume, use a formaldehyde quantity that ensures a permanent formaldehyde concentration in the air. A minimum quantity of 50 ml formaldehyde per cubic meter of safety cabinet volume should be vaporized.

The required formaldehyde quantity depends on the sample chamber volume (5 g/m³ dissolved in 20 ml water).

MSC 1.2	1.4 m ³	7.0 g	70 ml
MSC 1.8	2.1 m ³	10.5 g	105 ml

Ammonium solution (25 %)

MSC 1.2	1.4 m ³	14.0 ml
MSC 1.8	2.1 m ³	21.0 ml

B. Decontamination with gas

B.1.3 Performing gas disinfection using a hood

Item 875 (disinfection kit)

1. Switch the device off (OFF mode) and switch the device-integral power supply off.
2. Place the disinfection equipment [1] into the sample chamber and connect it to the outlet of the device-integral power supply.
3. Prepare and set the disinfection equipment according to the manufacturer's instructions.
4. Fill in formaldehyde and ammonia solution in accordance with the sample chamber volume (note safety instructions).
5. Close the front window, pull the hood [2] over the device, and seal it thoroughly against the environment using adhesive tape [3].
6. Switch the device on (blowers run at reduced operation, standby mode) and switch the device-integral power supply on to start the evaporation process.
7. As soon as the formaldehyde solution has completely evaporated, switch the safety cabinet to OFF mode and allow the formaldehyde to react approx 7 hours.
8. After a minimum of 7 hours, neutralization by ammonia should set in. After the ammonia solution has evaporated, switch the device back to standby mode and let the blowers run in reduced operation for approx 5-10 minutes.
9. Switch the safety cabinet back to OFF mode and allow the ammonia to react for approx 30 minutes.
10. Remove the tape and the hood, switch the blowers back on, and move the front window to the working position.



NOTE – Workroom airing!

**After completion of the decontamination process, ammonia vapors may escape from the sample chamber.
Therefore, air the workroom thoroughly!**

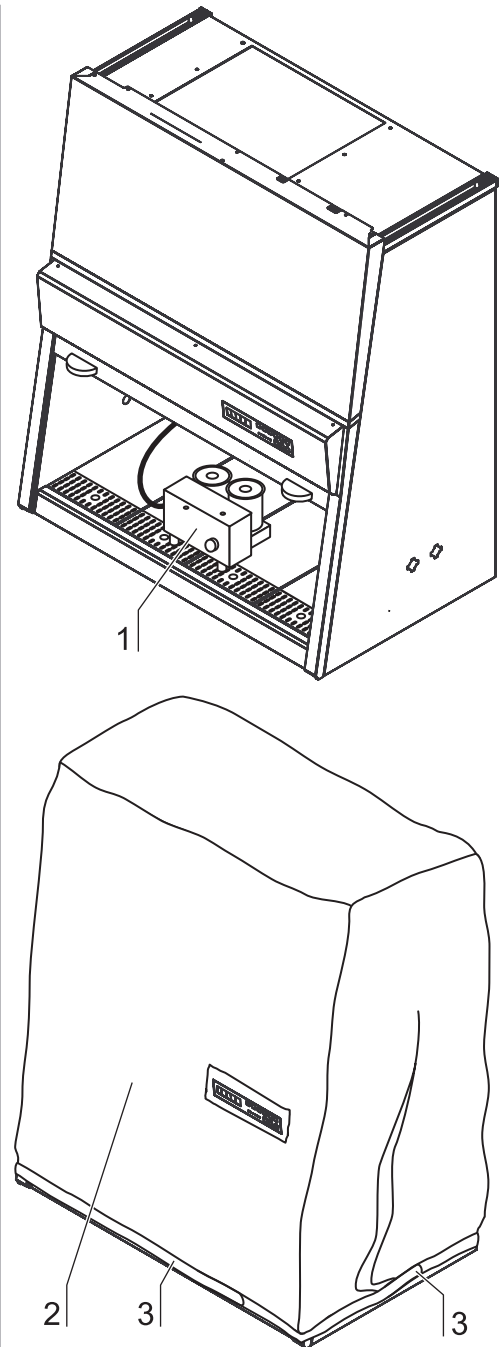


Fig. B1
Gas disinfection using hood

B. Decontamination with gas

B.1.4 Performing the alternative gas disinfection

1. Switch the device off (OFF mode) and switch the device-integral power supply off.
2. Isolate the device from the power supply system.
3. Remove the light dome (see Section 5.1.1).
4. Remove the front cover (see Section 5.1.2).
If required, disconnect the wiring of the device-integral UV lamp (option).
5. Remove the cable duct from the upper edge and disconnect the two wire connectors from the main PCB.
6. To dismount the mounting frame assembly [1], slightly loosen the two screws at the side, slide the mounting frame up, pull it forward, push it aside, and remove it.
7. Carefully plug and seal the exhaust filter aperture [3] using film and adhesive tape.
8. Place the disinfection equipment [2] into the sample chamber and connect it to the device-integral power supply system.
9. Prepare the disinfection device according to the manufacturer's instructions and fill it with formaldehyde and ammonia solution in accordance with the sample chamber volume.
10. Carefully plug and seal the safety cabinet front opening [4] using film and adhesive tape:
 - Push the front window as far down as possible and attach the film in the upper section.
 - Then, push the front window to the uppermost position and seal the lower section of the front opening.
11. Close the front window and reinstall the mounting frame [1].
12. Secure the cable link and reconnect the wiring to the main PCB.
13. Reconnect the safety cabinet to the power supply system and switch it on (the blowers should run in reduced operation, standby mode).
14. Switch the device-integral power supply system on so that the evaporation process starts.
15. As soon as the formaldehyde solution has completely evaporated, switch the safety cabinet to OFF mode and allow the formaldehyde to react for a minimum of 7 hours.
16. After a minimum of 7 hours, neutralization by ammonia should set in. After the ammonia solution has evaporated, switch the device back to standby mode and let the blowers run in reduced operation for approx 5-10 minutes.

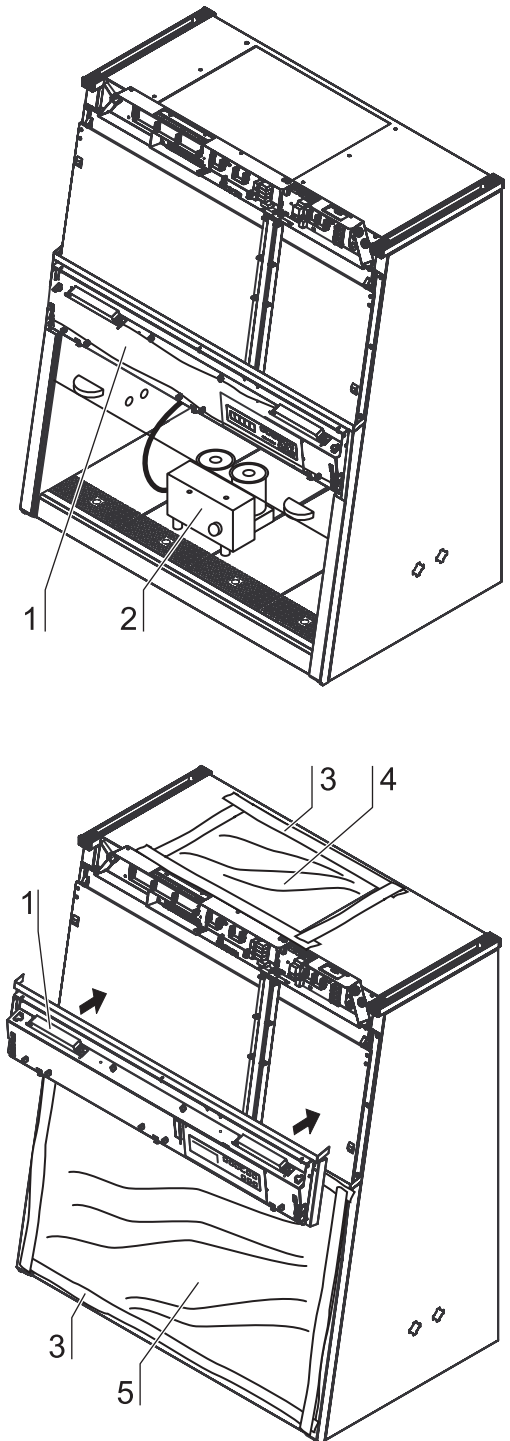


Fig. B2
Alternative gas disinfection

B. Decontamination with gas

15. Isolate the safety cabinet from the power supply system and allow the ammonia to react for approx 30 minutes.
16. Remove adhesive tape and film from the exhaust aperture.
17. Remove the mounting frame, remove adhesive tape and film from the front opening, then reinstall the mounting frame.
18. Install the covers (see Section 5.1.1 - 5.1.3).
19. Connect the device to the power supply system.

C. Spare parts

List 1:

Item	Part no.	Description	Section
10	50108638	CD documentation MSC Advantage	-
20	50059628	Downflow filter MSC 1.2 for exhaust system accessories	3.1
20	50077700	Downflow filter MSC 1.8 for exhaust system accessories	3.1
30	50075275	Activated charcoal filter MSC for exhaust system accessories	3.1
40	50044214	Silicone sealant, transparent	3.1, 3.2
50	50059628	Stand for racks	3.3
60	50110785	Pluggable sidewall lead-in	4.1, 4.2
70	50109978	Solenoid valve for gases 230V 50Hz	4.2
80	50108674	Moulding MSC 1.2	5.1
80	50108685	Moulding MSC 1.8	5.1
90	50110833	Light dome adjustable MSC 1.2	5.1
90	50110834	Light dome adjustable MSC 1.8	5.1
95	50047606	Adhesive label "LNE"	5.1
100	50108673	Torx screw M 4 x 12 for light dome	5.1
110	50108188	Front window guide cover left	5.1
120	50108189	Front window guide cover right	5.1
130	50110728	Front window stop left	5.1
140	50110729	Front window stop right	5.1
150	50110835	Front cover adjustable MSC 1.2	5.1.2
150	50110836	Front cover adjustable MSC 1.8	5.1.2
160	50077703	Knurled screw for front cover	5.1.2
170	50108096	Plenum box cover MSC 1.2	5.1.3
170	50108309	Plenum box cover MSC 1.8	5.1.3
180	50082694	Plenum lid seal MSC 1.2	5.1.3
180	50082695	Plenum lid seal MSC 1.8	5.1.3
190	50043931	Fluorescent tube for illumination 1200 mm 36 W 230 V	6.1
200	50033991	Rotating socket for fluorescent tubes	6.2
210	3000037	Cable support	6.2, 6.5
220	50108651	UVC degermination lamp 826 mm, 230 V	6.3
230	50108050	Mounting bezel UV MSC 1.2	6.4
240	50108318	Mounting bezel UV MSC 1.8	6.4
250	50108652	Rotating socket for UVC degermination lamp	6.4
260	50077060	UV cable lead-in	6.4
270	50073294	Clamp for UV WAGO 260	6.5
280	50108666	Illumination ballast unit MSC 1.2	6.5
290	50109161	Illumination ballast unit MSC 1.8	6.5
300	50108666	UV lamp ballast unit MSC	6.5
310	50073605	Frame with lid for country-specific outlets	7.1
320	50046191	Outlet USA/CAN	7.1

C. Spare parts

List 2:

Item	Part no.	Description	Section
320	50073606	Outlet Germany (grounding outlet)	7.1
320	50073607	Outlet Switzerland	7.1
320	50073608	Outlet Belgium, France, Czechia, Poland	7.1
320	50073609	Outlet Italy	7.1
320	50073610	Outlet Great Britain	7.1
320	50073611	Outlet Australia	7.1
320	50073612	Outlet Denmark	7.1
320	50073609	Outlet Italy	7.1
320	50073610	Outlet Great Britain	7.1
320	50073611	Outlet Australia	7.1
320	50073612	Outlet Denmark	7.1
330	50073613	Dummy plug for UV connection	7.2
340	3711067	UV connection - 3-way socket	7.2
350	50043783	Plug cap for UV socket	7.2
360	50073604	Frame for country-specific outlet	7.2
370	50046294	Adhesive label UV	7.2
380	50108654	Front foil keypad	8.1
390	50077521	Spacer display / light box	8.2
400	50107773	PCB display / operating panel	8.2
410	50108694	Spacer display / dome	8.2
420	50108687	Torx screws M4 x 8 Torx for display	8.2
430	50108653	Patch cable: Master PCB / display	8.2, 13.1
440	50108067	Perforated plate (filter protection) MSC 1.2	9.2
450	50108221	Perforated plate (filter protection) MSC 1.8	9.2
460	50108800	Tapping screw 3.5 x 9.5 for perforated plate	9.2
470	50108412	Inlet protection	9.3
480	50108110	Workplate module MSC Advantage	9.3
490	50059628	Exhaust filter MSC 1.2	9.4
490	50077700	Exhaust filter MSC 1.8	9.4
500	50073911	Downflow filter MSC 1.2	9.5
500	50074265	Downflow filter MSC 1.8	9.5
510	50076853	Pressure moulding for downflow plenum	9.5
520	50108673	Torx screw M 4 x 12	9.5, 10.1
530	50078303	Exhaust blower right adjustable	10.1
540	50078304	Exhaust blower left adjustable	10.1
550	50077505	Wing nut M 5 x 16 for exhaust plenum	10.1
560	50077654	Clamping disk for M 5	10.1
570	50077180	Downflow blower	10.2
580	50108687	Torx screw M 4 x 8 Torx for blower	10.2

C. Spare parts

List 3:

Item	Part no.	Description	Section
590	3719080	Hose support	10.2
600	50071701	Pressure sensor	11.1
610	50072680	Plug cap for test hose	11.1
620	3667303	PVC hose DI = 6 x 1.5 mm	11.1
630	50108823	Slip band for front window	12.1
640	50110781	Cable pulley adjustable MSC	12.1
650	50110427	Polyamide cable adjustable	12.1
660	50110779	Front window adjustable installed MSC 1.2	12.1
660	50110780	Front window adjustable installed MSC 1.8	12.1
665	50082536	Adhesive tape, completely removable	12.1
670	50110837	Handle for front window MSC	12.1
675	50047606	Damper front window top	12.1
680	50073690	Position switch with roller lever	12.2
690	50109423	Wiring diagram MSC Advantage	13.1
700	50110370	Connection scheme MSC - Main PCB	13.1
700	50110371	Connection scheme MSC Advantage	13.1
700	50109533	Connection scheme MSC - 230 V outlets	13.1
700	50109460	Connection scheme MSC 1.2 - 230 V light box	13.1
700	50109447	Connection scheme MSC 1.8 - 230 V light box	13.1
710	50046005	Power cable EU (grounded)	13.1
710	50058427	Power cable USA	13.1
710	50067124	Power cable Switzerland	13.1
710	50067125	Power cable Italy	13.1
710	50067126	Power cable Great Britain	13.1
710	50067127	Power cable Denmark	13.1
710	50067177	Power cable Australia	13.1
720	50110542	Power cable mounting set	13.1
730	50110102	Power supply unit 100 - 230 V / 48 V 300 W	13.1
740	50074769	Spacer for main PCB	13.1
750	50107628	Main PCB MSC Advantage	13.1
750	50110950	Main PCB MSC Advantage replacement	13.1
760	50048127	Screw coupling for D-SUB interface	13.1
770	3002007	Traction relief for alarm output	13.1
780	50108704	Traction relief for power input	13.1
790	50063118	Fuse cartridge 16.0A 250V T 6.3x32mm	13.1
800	50073715	Fuse cartridge 5.0A 250V T 6.3x32mm	13.1
810	50110842	IC EPROM MSC ADJUSTABLE REPLACEMENT	13.1
820	50077228	Pressure sensor wiring set	13.1
830	50108665	Illumination wiring set MSC 1.2	13.1

C. Spare parts
List 4:

Item	Part no.	Description	Section
830	50109031	Illumination wiring set MSC 1.8	13.1
840	50108463	Illumination and UV wiring set MSC 1.2	13.1
840	50108548	Illumination and UV wiring set MSC 1.8	13.1
850	50108462	Outlet wiring set MSC 1.2	13.1
850	50108547	Outlet wiring set MSC 1.8	13.1
860	50108538	Power supply unit wiring set MSC 1.2	13.1
860	50108549	Power supply unit wiring set MSC 1.8	13.1
870	50078904	Ferrite ring, power supply unit wiring set - low voltage	13.1
875	50109998	Safety cabinet disinfection kit	B 1.3
880	50078613	Electrical lift unit "Multilift" left	—
890	50078614	Electrical lift unit "Multilift" right	—
900	50078615	Control 230 V for Multilift	—
910	50110301	Operating instructions for electrically adjustable racks	—

D.**Test report****Test report****Device ID No:****Device serial number:****Date of test:****Date of repeat test:****Test results:**

Electrical tests

Ground resistance:

Leakage currents:

Airflow velocity tests

Inflow velocity:

Downflow velocity:

Airflow pattern tests

Airflow direction:

Front window leakproofness:

Work aperture leakproofness:

Seal leakproofness:

Filter leak tests

Exhaust filter leakproofness:

Downflow filter leakproofness:

Prefilter element leak test:

Values for ergonomic tests

Lighting intensity:

Vibrations:

Noise level:

UV intensity

Tester

Surname:

First name:

Company:

Phone:

Fax:

Date, Signature



Internet: <http://www.Thermo.com>